People's Republic of China
State Environmental Protection Administration

Government of the Netherlands
Ministry of Foreign Affairs

Masterplan for the Rehabilitation of Lake Tai

Inception Report

final version

太湖

Grontmij Consulting Engineers / FECO of SEPA
August 2001

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Preface

This report presents the findings of the first phase of the Master Plan for the rehabilitation of Lake Tai. The so-called Inception Phase consisted of two parts: data collection and project planning. Data collection, in order to find out what information on the Lake Tai area is available already, which of this can be used for the Masterplan Study, and on which fields more research is necessary. Project planning, in order to establish the approach for the implementation of the consultancy, and a work schedule and programme for all the institutes involved, by which the objectives of the Study can be reached.

An important aspect of this inception phase has been a field visit and technical meeting in November 2000, in which the Dutch team members could take a look at Lake Tai themselves, and speak to the organisations involved during very fruitful workshop sessions. Using this way the Project Team would like to thank all involved parties who made this mission that successful.

The Inception Report is the first deliverable of the consultancy, which started effectively on September 1st 2000. In this Inception Report, the Project Team presents its findings on the preliminary data collection, and proposes a work plan for the coming study period. An important part of this work plan is the provision of separate Terms of Reference for each party involved. The Project Team expresses its hope for a very fruitful continuation of this already well-developed Sino-Dutch co-operation.

On behalf of the Project Team,

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Contents

1 Introduction

1.1 Project description

1.1.1 Project background

Lake Tai is situated south of the Yangtze delta, in the eastern part of China. It is one of the five largest freshwater lakes in the country. The average distances from south to north and east to west of the lake are 68.5 km and 34 km respectively. Its surface area is 2,338 km^2. The lakeshore covers a distance of 405 km and the average and maximum depths are 1.9 and 2.6 m respectively.

The total population around the lake basin is approximately 34 million, with an estimated density of 910 persons per km^2, spread over seven medium to large cities and 27 towns. This population has played an important role in the economic development of China. It contributes to 12.5 to 14.2% of national GNP, 3% of national food production, 11% of national freshwater products and 25% of national freshwater fish production.

Lake Tai

Lake Tai is situated at 30°55′42″to 31°33′50″N and 119°53′45″to 126°36′15″E. It stretches across the two provinces of Jiangsu and Zhejiang. To its north is Wuxi, its south Huzhou, its west Yixing and Changxing, and to its east Suzhou and Wujiang.

The north of the Taihu region which centers around Lake Tai faces the Yangtze River; its south faces the Hangzhou Bay and its east faces the East China Sea; on its west stands the Yili Mountain of the Tianmu Mountains. The Lake Tai region has a total area of 35,272km^2, of which 53% belongs to Jiangsu Province, 13.5% belongs to the municipality of Shanghai, 33.4% belongs to Zhejiang Province, and about 0.1% falls into the jurisdiction of Anhui Province. The total drainage area of Lake Tai is as large as 36,500km^2.

There are many rivers flowing into and out of Lake Tai. According to the investigation conducted in 1987, there are as many as 224 outlets around Lake Tai that connect the lake with other rivers. Major five sub-river systems of Lake Tai water system include that of the Western and Eastern Tiaoxi Rivers, the Jingxi River, the Huangpu River, and the Grand Canal. Lake Tai has as many as 70 inflow rivers, most of which take their origins at the mountains to its west. The Eastern Tiaoxi River, the western Tiaoxi River and the Jingxi River are the major water sources of Lake Tai. Most of the 150 outflow rivers are concentrated to the east and north of the lake. Major existing outflow rivers include the Huangpu River, the Wusong River, the Wangyu River, the Liuhe River, the Taipu River and the Liangxi River, which form two main water systems of the Huangpu River and the Grand Canal.

The lake serves many functions in its catchment areas: storage of flood water, irrigation, shipping, drinking water supply, fish farming, tourism, etc. It is a major drinking water source for the municipalities of Wuxi, Suzhou, and - indirectly - Shanghai. However, rapid industrial and agricultural developments, as well as excessive population growth during the last 20 years, have resulted in a massive increase in pollutants being discharged into the lake, especially untreated municipal wastewater, fertilisers, pesticides and pollutants from fish farming. These activities, together with the lack of stringent legislative controls, adequate management devices and sufficient engineering measures,

have caused serious environmental problems, including eutrophication, organic pollution and the destruction of the aquatic ecosystem. The pollution in Lake Tai has reached a level at which the actual water quality is not satisfying the functions required of the lake. In particular, the deteriorating water quality in the lake threatens the drinking water supply of millions of people living along its perimeter.

If the current trend continues, the environmental problems of Lake Tai will become so severe that the lake will lose all of its important functions. Consequently, the long-term goal of sustainable economic development in the region would be inevitably affected.

In view of the serious environmental situation and the Taihu Basin's important role in Chinese economic development, a State Council pollution and prevention plan has been formulated entitled, "Taihu Water Pollution Control and Prevention Plan for the Ninth 5-Year and 2010". This plan covers the years 1997 to 2010 and is divided into three time periods:

- Phase 1: 1997-1998
- Phase 2: 1999-2000
- Phase 3: 2001-2010.

Phases 1 and 2 are regarded as short-term goals and phase 3 is the long-term goal. In the plan, the targets, objectives and action plans to be achieved during each phase have been defined.

These include:

- the targets for total pollutant discharges and pollutant reductions in the designated areas;
- measures to control industrial pollution (e.g. closing down, combining industrial plants and changes in industrial practices, as well as the requirements of complied discharges);
- the construction and expansion of wastewater treatment plants;
- the reduction of areas for fish farms within the lake;
- encouraging eco-agricultural practices.

These targets and measures have been provided as guidelines for provincial, municipal and local governments in their formulation of implementation and development plans.

In order to facilitate the implementation of the State Council's Ninth 5-year and 2010 Plan, and following a discussion between the State Environmental Protection Administration (SEPA) and Mrs de Boer of the Dutch Ministry of Housing, Spatial Planning and Environment during her visit to China in June 1996, Grontmij Consulting Engineers, the Netherlands, together with SEPA, proposed to both government departments that they carry out a Masterplan for the rehabilitation of Lake Tai. This project was eventually approved in May 2000 and is subsidised by the Dutch Government according to the MILIEV programme.

1.1.2 Project objectives

In view of the serious pollution problems and the importance of the Taihu Basin's role in Chinese economic development as mentioned above, it is considered necessary to formulate a Masterplan which can provide guidance and tools in achieving a sustainable development of the region through a rehabilitation of Lake Tai. The project has therefore adopted an integrated approach for sustainable lake management with reference to experiences drawn from the Netherlands. It is a combination of engineering (prioritising

engineering projects) and scientific (water quality modelling) solutions, recommendation of effective management measures (institutional strengthening and legislative controls) and capacity building (technology transfer and training). It aims to be closely linked to the Ninth 5-year and 2010 plans, particularly those guidelines for pollution control measures.

The study basically consists of two parts: the short-term Cleaning-up Programme (Phase I) and the long-term Master Plan Study (Phase II) with the following objectives:

- Short-term: Evaluate both environmental effectiveness and social economic development after the implementation of phases 1 and 2 of the Ninth 5-year and Year 2010 Taihu Catchment Pollution Control and Prevention Plans. To recommend and prioritise engineering projects to assist local government in decision making (Phase I).

- Medium and long-term: Based on the evaluation and the prediction of environmental and social economic developments, to formulate a prioritised action plan for 2002 to 2005 and the Masterplan for 2010 water pollution control and ecological conservation (Phase II).

1.2 Introduction of the consultants involved

To implement the Masterplan Study a Dutch consortium was formed to be able to do the necessary studies. This consortium consists of Grontmij, IHE-Delft and AquaSense. The consortium works together on this project with a number of Chinese partners. Their particular field of expertise is described below.

1.2.1 Grontmij Consulting Engineers

Grontmij, the project team leader, is one of the leading engineering consulting companies in the Netherlands, providing a full range of multi-disciplinary services. The company has particular experience in projects related to integrated water management. The primary goal of Grontmij is to stimulate and conduct integrated, interdisciplinary projects focused on sustainable land use in which water plays a major role.

1.2.2 IHE-Delft

IHE is an international institute for scientific research and postgraduate education and training in the fields of water, the environment and transportation. Its main aim is to contribute to the international exchange of knowledge and skills among professionals in order to achieve a more equal distribution of knowledge and to increase the capacity of institutions in different countries.

1.2.3 AquaSense

AquaSense, a company that recently joined the Grontmij Group, specialises in the development and implementation of total water management systems. Development of models, state of the art monitoring techniques, the use of GIS and ICT-applications are key aspects of the company's activities.

1.2.4 State Environmental Protection Administration

The State Environmental Protection Administration of China (SEPA) is a ministerial-level authority directly under the State Council in charge of environmental protection in China. Its main responsibilities include the formulation of national environmental policy and the supervision over the national monitoring network. The two departments involved

in this study are the Foreign Economic Cooperation Office and the Department of Pollution Control.

1.2.5 Nanjing Institute for Environmental Sciences

NIES undertakes the research on rural ecology, nature conservation, prevention and control of the pollution from township and village industrial enterprises and agricultural chemicals, undertakes national key research programs on the rural environment, nature and ecological conservation, provides a scientific basis and technical support for the management of rural environment and nature and ecology conservation.

1.2.6 Renmin University, Institute of Environmental Economy

The Institute of Environmental Economics (IEE), Renmin University of China was founded in 1988. IEE consists of three research divisions:

- the Environmental Planning Division,
- the Natural Conservation Division,
- the Public Policies for Environmental Protection Division.

1.2.7 Taihu Basin Water Resources Protection Bureau

Taihu Lake Basin Authority of Ministry of water Resources (TBA) is an agency under the command of the Ministry of Water Resources, which is responsible for the total control of the water affairs of the Taihu Lake Basin. Under TBA there are departments of planning, water reservoirs, water affairs, water control, and water resource protection.

1.2.8 Jiangsu Environmental Protection Bureau

The Jiangsu Environmental Protection Bureau is responsible for provincial environmental protection. The department involved in this project is Jiangsu International Environmental Development Center JIEDC. This center was established in 1993. There is 15 staff at present, including 3 senior engineers and 8 engineers.

1.2.9 Zhejiang Environmental Monitoring Centre

Founded in 1980, Zhejiang Provincial Environment Monitoring Center boasts fifty-six staff members. It is the provincial center of technology, information, network and training within the field of environmental protection.

These organisations are presented more detailed in Annex 5, while the organisational structure of the project team is presented in paragraph 5.1.

1.3 Project phases

The date of the commencement of the consultancy was agreed and fixed on the 1 September 2000. According to the Technical Proposal, the consultancy services should have a duration of 24 months. A number of phases can be distinguished during the project:

- Inception Phase
  a) Project Planning Phase
  b) Data Collection Phase

- Phase I: Engineering Study Phase (Cleaning-up programme)
- Phase II: Masterplan Study Phase

This report presents the result of preliminary data collection and project planning during the inception phase, which covers the period from 1 September to 30 November, 2000. The objectives of the Inception Phase are:

- to provide lists of the existing data, including data sources and the overall view of reports related to the study;
- to identify the gap between the existing data and required data so as to determine the need and scope of any additional data collection if necessary; and
- to define the scope of this consultancy study, determine a detailed study programme and allocate tasks to be undertaken by the Sino-Dutch study teams.

It should be noted that as only preliminary data collection has been conducted. The information provided in the report may not be conclusive. It primarily provides a basis for more detailed data collection. The detailed report on data collection should be presented in the Data Collection Report, to be delivered in February 2001.

1.4 Structure of the report

After this introductory chapter, a report is given on the November mission to China. This includes a report on the different activities undertaken and organisations visited, as well as the interpretation by the Dutch team on the mission's findings.

Chapter 3 consists of a preliminary review of available data. This review has been prepared, mainly based on the results of the November mission, and is therefore not complete. However, some guidelines can already be given regarding the necessity of additional data collection and research.

The fourth chapter presents the core of the Project Planning Phase: the overall study approach is presented, which explains the background of the study, as well as the work programme for the different tasks to be undertaken. Chapter 5 concludes with more details on the project organisation, including its roles and responsibilities.

In the Annexes among others the different Terms of Reference for the involved institutes will be given, as well as a preliminary overview of available and needed data.

2 Report November trip

In this chapter, an overview will be given of the visit to China by the Dutch project team between November 2 and 17, 2000. The visit incorporated a field trip along the Taihu region, including visits to the cities of Suzhou, Wuxi and Huzhou and a four-day technical meeting in Hangzhou. The aim of the trip was to finalise the data collection and project planning phases.

2.1 Field trip

A field trip by the Dutch team accompanied by a representative from the Foreign Economic Corporation Office (FECO) of SEPA was conducted between 4 to 8 November, 2000. During the period, the Dutch team undertook the following key activities:

Figure 1 : Meeting at Suzhou EPB

- Conducting meetings with the Suzhou Environmental Protection Bureau (EPB), Wuxi EPB and Huzhou EPB to discuss key environmental problems of Lake Tai and listen to their introduction of the environmental control measures and actions that had been undertaken in their respective municipalities.
- Visiting a drinking water intake near Suzhou and taking a boat trip on Lake Tai in the Wuxi area. These visits allowed the Dutch team to see the degrees of water pollution in different parts of the water bodies and the impact on its functional uses.
- Visiting wastewater treatment plants (WWTPs), including two in Suzhou, one in Wuxi and one in Huzhou. These visits provided the Dutch team with first hand information on the types of wastewater treatment technologies, the treatment capacity, the sewage collection system, management system, charging scheme and operational costs, etc.
- Visiting the Wuxi Monitoring Centre and a Huzhou automatic water quality monitoring station that was one of the Taihu network of monitoring stations.
- Visiting an eco-agricultural farm close to Huzhou. The farm consisted of a combination of livestock, crops and plants. It operated on an enclosed ecological and self-supplying system.

Figure 2: The project team on the shore of Lake Tai

The general conclusions of these visits are that substantial measures have been undertaken in response to the Ninth 5-year and 2010 plan. The following is a summary of the Dutch team's observations:

- A large of number of heavily polluted industries have been closed down. The existing industries have been requested to achieve compliance discharges through the installation of wastewater pre-treatment facilities. However, the compliance discharges have not been achieved fully by manufacturers due to a number of reasons. One of the typical reasons is high operational costs which do not make it cost-effective to run an industrial wastewater treatment facility.

- A large number of WWTPs have been built and are under construction to treat municipal wastewater. However, it has been noticed that there are a number of problems related to the operation of WWTPs, including under operation due to an inadequate sewage collection system and inadequate treatment facilities to cope with difficult wastewater streams, such as leachate. It is therefore important to ensure the construction of sufficient/adequate sewage treatment facilities together with an effective collection system.

- Pollution control in rural areas is still problematic. Control measures for wastewater and solid wastes in rural areas are rather weak. The majority of wastewater generated from rural areas is directly discharged into local water bodies and refuse can be found dumped throughout the countryside.

- More structured, comprehensive and frequent monitoring work within Lake Tai and within major river courses around the lake have been carried out by various EPBs in accordance with defined requirements stipulated by SEPA since 1998. Thus substantial water quality data, together with some ecological and hydrological data, have been collected through these routine monitoring programmes.

In addition to the field trip, the Dutch team also visited and conducted a meeting with the Taihu Basin Water Resources Protection Bureau (TBWRPB) on 15 November, 2000. During the meeting, the TBWRPB first gave an introduction on the work and duties which they had undertaken in the Taihu Basin, and then provided a brief description on the River Network Model (a comprehensive water quantity and quality model of the area around Lake Tai, which was developed in Sino-Dutch co-operation) and data that has been adopted by the model. This provided the Dutch team with an insight into the availability of water quality and quantity data and types of models.

Figure 3: Meeting at TBA

2.2 Technical meeting

2.2.1 General Description of Technical Meeting

Technical meetings for the projects were held in Hangzhou between 9 and 12 November. The technical meetings were organised and hosted by FECO, SEPA with the assistance of the Zhejiang Provincial EPB. The main purposes of these meetings included:

- to disseminate the information to the Chinese team on the Masterplan for the Rehabilitation of Lake Tai;
- to exchange view and information on the study between the Sino-Dutch project teams;
- to provide an opportunity for the Dutch study team to understand the extent of research and monitoring work to be carried out up to now, so as to define the scope for the study.

During the meetings, there were about 40 participants from over 10 organisations, which have been included in the table below.

Chinese side	Dutch side
State Environmental Protection Administration	• Mr. Enrico Moens - project manager Taihu • Mr. Mario Maessen - Water Quality Expert • Mr. Hillebrand Ehrenburg - Expert Waste & Wastewater Management • Mr. Hans van Bruggen - Training Expert • Mr. John Meulemans - Expert on Modelling and Monitoring • Ms. Wendy Tao - Project Co-ordinator • Mr. Erwin de Bruin - Project Administrator
Nanjing Institute of Environmental Science, SEPA	
Taihu Basin Water Resources Protection Bureau	
Jiangsu Province: - International Environmental Development Centre of Jiangsu - Wuxi EPB - Wuxi Environmental Monitoring Centre	
Zhejiang Province: - Zhejiang Provincial EPB - Zhejiang Environmental Monitoring Centre	
Renmin University of China	
Yangtze Valley Water Resources Protection Bureau, Shanghai Branch	

It also included guests from the Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences (NIGL) and the Jiangsu Province Water Resources Bureau.

There were a number of activities being undertaken during the meetings, including:

- Introduction of integrated water management in the Netherlands;
- Introduction of the aspects of the Masterplan for Rehabilitation of Lake Tai by the Dutch team, including water, wastewater management, socio-economic and institutional aspects and technology transfer and training;
- Presentations on monitoring work, data availability, previous research, pollution control and environmental protection measures in the Taihu Basin by the Chinese team and guest speakers.

Figure 4: Workshop during the Technical Meeting

A detailed programme for the technical meetings is presented in Annex 1.

2.2.2 Description of Findings

Data Aspect: Based on discussions with the Chinese project team, it seems that substantial data relevant to the Masterplan is available and can be obtained from various organisations, including various EPBs, the SEPA Monitoring Centre, TBWRPB and NIGL. Data on the chemical properties of water quality has been collected by EPBs and TBWRPB through their respective on-going regular environmental monitoring programmes, although different analytical methodologies have been adopted. The most comprehensive hydrological data covering a long time-span could best be obtained from TWBRPB although more recent data can also be obtained from EPBs. Information on ecology, nutrients, waste and wastewater management, point and non-point source pollution can be obtained from SEPA, local EPBs, and monitoring centres and/or environmental research institutes. However, data for nutrient cycling, ecological relations, non-point sources may not be sufficient. General information, such as meteorological conditions, socio-economic developments, can be found in the local yearbook, city plan and other sources.

Various research and study programmes have been carried out by TBWRPB, NIGL, NIES and EPBs. The research conducted by TBWRPB through international co-operation programmes include the study on eutrophication funded by the Japanese in 1985 and the water quality modelling study assisted by the Dutch between 1995-1997. NIGL has conducted a number of studies on sediment, species composition and ecological relationship in the lake. They conduct integrated sampling to obtain hydrological, meteorological, chemical and biological information. One of NIES' projects relevant to this study involved the study of eco-agriculture, consisting of studies on livestock, the usage of fertilisers and bio-diversity. Through the study, they undertook investigations on non-point source pollution around the Taihu Basin. Local EPBs have participated in a number of international co-operation programmes with Japan and New Zealand over the past decade concerning Lake Tai.

A preliminary description of available data, their sources for each aspect and data gaps are presented in Chapter 3.

Other Observations: It has been observed that substantial pollution control and protection measures, as mentioned in section 1.1.1, have been undertaken since the implementation of the Ninth 5-year and 2010 plan. However, Lake Tai's water pollution problems have not been brought under control and the water quality is not as good as anticipated. This has underlined the urgent need for a long-term pollution control and protection programme for Lake Tai in order to achieve the required level of cleanness. According to the Dutch team's observations, the key problems related to pollution control include:

1. Diffuse sources of pollution. Although various measures have been implemented to change agricultural practices to reduce the consumption of fertilisers in order to minimise the seepage of nitrogen and phosphate into the lake, the control of non-point source pollution is ineffective.
2. Inadequate and insufficient provision of WWTPs and sewage system. There is a need to improve treatment facilities to include the removal of nitrogen and phosphate.
3. Problems 1 & 2 resulted in an ineffective control of organic pollution, as agricultural and domestic wastewater are the major sources of nitrogen and phosphate.
4. The lack of a thorough and detailed study to support and analyse the effectiveness of all recommended measures prior to their implementations. Due to the urgent need, the Ninth 5-year and 2010 plan was completed within five months and based on the existing data within the institute involved. Thus these measures may not be sufficient.

5. The lack of co-ordination between various government departments involved in environmental protection and pollution control at Lake Tai may result in inefficient management practices.

Considerations in the Masterplan: Based on the results of the field trip and technical meetings, the Dutch team has concluded that the following attention should be given in addressing the four elements of the Masterplan in the subsequent study phases:

- Water quality model: In considering the water quality model, the influences of various factors affecting the lake water quality will be taken into account. These include the flood control outside the lake; hydrological relations with its surroundings; the effects of the removal nutrients at sources and the effects of drawing water from the Yangtze River.

- Wastewater management: Both short and long-term solutions will be considered with different priorities and emphases on wastewater generated from municipal areas, towns and villages, industrial premises and agriculture. In terms of techniques, more focus will be put on the construction of sewage systems, technologies for nitrogen and phosphate removal; and optimisation of size and location of plants.

- Socio-economic and institutional aspects: For the former, a review of existing data and interview of major stakeholders will be conducted together with cost-effectiveness analysis. The latter study should consist of the description of Chinese water management structure (organisations, tasks, instruments); comparison with structures in the Netherlands and other selected countries; institutional analysis of the Chinese management structure; and provide information on the transition from planned to market-oriented management systems and short-term options for solving problems in the water management structure of Lake Tai

- Training and knowledge transfer: In order to strengthen their technical and management capabilities, it is intended to provide training for Chinese professionals and managers in lake management. Three types of training have been identified, including: 1) training at professional level; 2) training at M. Sc. level; 3) Study visits for officials. Training will include a combination of lectures on various water management issues, group work, fieldwork, presentations and excursions in the Netherlands. In order to facilitate the exchange of information between Chinese professionals and officials, it is also intended to overlap official visits with part of the professional training programme.

A detailed description of the study approach for the above mentioned four aspects is presented in Chapter 4.

2.3 Conclusions

It was a very constructive and beneficial trip for the Dutch team. In particular, it has enabled the Dutch team to understand the key environmental problems that exist in the area and the type and effectiveness of the environmental measures that have been undertaken in the Taihu Basin. This trip has also assisted the Dutch team to evaluate availability of data and research work and to formulate methodologies and access the scope of the four aspects of the studies.

Figure 5: Some of the participants at the Technical Meeting

3 Preliminary review of data

3.1 Introduction

As the data collection phase has not been concluded yet, the review presented in this chapter is preliminary, and mainly based on the information gathered by the Dutch experts during the November visit. In this introduction, the methodology of obtaining the data overview is presented. Afterwards, an overview is given of the available data known to date. Furthermore, an overview is given of the data which is needed. After the data collection phase has been finished, this overview can be compared with the available data. Doing this, gaps can be discovered and action can be undertaken to obtain missing data. The conclusions in paragraph 3.4 mention which activities still should be undertaken in order to finalise the data collection phase and continue with the rest of the study.

The purpose of the data collection at this stage is to provide a list of existing data relevant to the study, including the data sources and formats. This will provide a foundation to identify gaps between the existing and required information, so as to identify any need for additional data collection.

Initial data collection was carried out during the technical meeting in November, and will be finished by experts from Nanjing Institute of Environmental Science, Taihu Basin Water Resources Protection Bureau, Jiangsu EPB, Zhejiang Monitoring Station, Wuxi EPB and Renmin University. The scope of data collection consists of the following aspects:

1. general data;
2. water quantity data;
3. water quality data;
4. pollution sources;
5. waste and waste water management;
6. socio-economic data;
7. institutional data.

For each aspect, a list of information to be collected has been prepared. Detailed parameters of data collection are presented in the following paragraphs and Annex 2. The scope of data collection was determined after a number of discussions between Chinese and Dutch experts in August 2000, and has been fine-tuned during the sessions in November.

3.2 Preliminary inventory of available data

The following inventory is mainly based on the results of the workshops in November, and therefore is by no means complete. It should be noted that the emphasis during the technical meeting was put on the water quality aspects. Basic data on waste and wastewater was collected during the field trip, but due to the shortness of the trip and the technical meeting not all required information about this aspect could be obtained. Below a summary has been presented of data availability, a more detailed overview can be found in Annex 2.

The following key has been used:

+ sufficient data available
+/- data available, but not detailed enough: further research needed
- no data available yet

Project categories and aspects	Data availability	Remarks
1. general		
1.1. (hydrological) boundaries project area	+/-	Taipu region very complicated, but most important knowledge available
1.2. geographical description	+/-	no detailed digital maps available
1.3. geological description	+/-	no detailed digital maps available
1.4. meteorological data	+/-	Data from more stations needed
1.5. land use	-	no digital data available
1.6. water functions	+/-	
2. water quantity		
2.1. overview of water resources in project area	+/-	only daily river levels available
2.2. in/outflow lake	+	most important rivers in water quantity model
2.3. water quantity model surrounding rivers	+	most important rivers in model
2.4. water quantity model Lake Tai	-	under construction
3. water quality		
3.1. water quality lake	+	
3.2. water quality incoming rivers	+/-	minor rivers not sampled
3.3. sediment	+	
3.4. ecological data	+/-	only plankton data available. More data needed on fish, fisheries and ecological relations
3.5. sediment-water interaction	-	
3.6. water quality model surrounding rivers	-	no existing model
3.7. water quality model Lake Tai	-	under construction
4. pollution discharge sources		
4.1. point sources	+	
4.2. non-point sources (< 100 kg BOD/day)	-	only indicative values available
5. waste and waste water management		specific research for this aspect is necessary
5.1. inventory of sewer systems in project area	-	
5.2. methods of waste water discharge/treatment in places without sewer systems	-	
5.3. inventory of wastewater treatment plants	-	
5.4. solid waste discharge, dumpsites	-	
6. socio-economic aspects		
6.1. economic development	+	available in yearbooks
6.2. population growth and distribution	+	available in yearbooks
7. institutional aspects		
7.1. boundaries of administrative regions	+/-	
7.2. overview of actors involved in water management, relations and functions	-	specific research necessary
7.3. competencies of actors, available instruments	-	specific research necessary
7.4. overview of existing laws, plans and policies	+/-	to be made

3.3 Inventory of required data

A general overview of data required is already incorporated in the overview above. Specific attention points for the data collection phase are included in the following sub-paragraphs. This listing should be seen in relation with the project activities as mentioned in Chapters 4 and 5.

3.3.1 Phase I - Cleaning-up Programme

For the Cleaning-up Programme (or Engineering Study) information is needed especially about pollution sources, existing and planned waste water treatment plants and sewage systems. The following data is required:

Sources (domestic and industry)

- number of people/cities, water consumption/capita
- number and type of industry
- amount and characteristics of domestic wastewater (as much as possible specific for neighbourhoods)
- amount and characteristics of industrial wastewater (as much as possible specific for types of industry)
- map of project area: urban areas, industry areas and location of the major polluting enterprises, sewer lines, surface waters
- sanitation practices and collection systems (population served, night soil, sewerage)
- existing sewer system: where, type (separate or combined), year of construction, point of discharge
- method of discharge - pre-treatment (e.g., septic tanks, settling, infiltration)
- building codes, design, costs for pre-treatment (e.g., septic tanks)
- plus the prognosis for the development of the above data

Pollution control measures

- existing and planned wastewater treatment plants: type, design capacity, actual flows, treatment performance (organic, nutrients and pathogens), sludge treatment and disposal, discharge point of effluent, engineering projects and location
- local technologies versus preferred, feasible treatment system (policy, financial resources)
- experience with alternative wastewater treatment systems (e.g. research activities)
- central versus decentralised treatment (related to (non)available sewer system)
- scope for cleaner production (water saving and re-use in industry)

Feasibility of possible solutions

- regulatory framework (e.g., standards)
- institutional set-up: organisation responsible for design, construction and operation of sewer systems and treatment plants
- technical know-how and managerial capacity
- financial feasibility: costs for collection and treatment, investment budget, price of water; fees (water and/or discharge)
- scope for cleaner production (water saving and re-use in industry)
- financial feasibility: costs for collection and treatment, investment budget, price of water; fees (water and/or discharge)

3.3.2 Phase II - Masterplan study

Target of the project is to give an evaluation of the effectiveness of proposed control measures to improve water quality until water quality meets the given standards. For an accurate evaluation proper insight in the functioning (hydrological, ecological and water quality) of the lake is needed. An effective way to evaluate different scenarios is building a water quality model. For a water quality model the following data are needed:

General data

- water quantity incoming water (including seepage and upwelling of ground water)
- rain and evaporation daily
- irradiation daily
- wind speed and direction every three hours
- temperature water weekly

These data should result in a closed water balance. Furthermore, a geographical map with depth profiles and an indication of where all the water inputs and outputs occur is needed.

Water quality

- quality in the lake at least 10 points
- quality of incoming rivers
- release of nutrients of sediments
- parameters quality data
- nitrogen (ammonium, nitrate, t-N)
- phosphorous (o-PO4, t-P)
- macro ions
- oxygen (O2, BOD)
- Suspended solids
- Ecological data
- Insight in food web
- algae composition
- response of species to different (new) conditions (fish, algae)
- biomass (fish, shellfish) removed from lake

Socio-economic and institutional data

Insight in the reaction of the Lake on measures are not the only things one should know to judge whether a measure is feasible or not. Socio-economic and institutional analyses are used to make clear whether the organisational structure of the lake's management system is fit for these measures, and whether the socio-economic results of proposed measures are desirable or not. Therefore socio-economic and institutional data is required. Since this data to a large extent will have to be collected in the course of the project, an overview of this activity will be given in Chapter 4.

3.4 Conclusions

Since the data collection phase has not been ended yet, no definite conclusions can be made. However, it appears from the initial findings that in general quite much data is available for the project activities. Exceptions exist, for instance on sediment-water interaction and non-point sources more research is required. Also for the waste water management aspect hardly any data is available yet.

Clearer conclusions can be made after the data collection report has been delivered by the Chinese counterparts. The data collection report is to be delivered on 28 February 2001. On the basis of this report, decisions can be made (in co-operation with the counterpart organisations) which additional data collection or further research is needed.

4 Study approach

4.1 Introduction

In this chapter, the study approach is presented. In this introduction, the project phases which have been distinguished are described in detail, together with the deliverables these should produce, and the task groups responsible for these deliverables. Afterwards, insight will be given in Integrated Basin Management, which is the guiding principle for the Masterplan study. To conclude the introduction, an overview will be given of the study activities. These activities are presented separately in the subsequent paragraphs of this chapter.

4.1.1 Project phasing and deliverables

As was discussed in Chapter 1, the study phase of the project is divided into two main phases: the Short-term Cleanup Programme and the Masterplan Study. The main deliverable of the Clean-up Programme is the Engineering Report, the main deliverable of the Masterplan Study is the actual Masterplan.

In order to perform the two studies, four task groups have been identified:

Task Group 1:	Water Quality
Task Group 2:	Wastewater Management
Task Group 3:	Socio-economic and Institutional Aspects
Task Group 4:	Training & Transfer of Knowledge

The main deliverables which can be distinguished are:

- Data Collection Report: gives an overview of data available and research carried out with regards to the Taihu Basin area;
- Engineering Report: recommends and prioritises engineering projects regarding wastewater treatment around Lake Tai (end of Phase I);
- Water Quality model: a tool for the study group as well for decision making which makes it possible to see and evaluate the influence of different control measures on the water quality of Lake Tai;
- Masterplan: provides recommendations for long-term management of Taihu Basin, including an overview of the expected outcomes of control measures regarding technical, socio-economic and institutional aspects (end of Phase II).

The Task Groups each will work on a specific aspect of the project. In order to obtain the integrated approach of the project, it has been decided to work according to the principles of Integrated Basin Management, which will make it possible to relate the work of all Task Groups to each other in a comprehensive framework.

4.1.2 Integrated Basin Management

Integrated Basin Management (IBM) is the management of a water system as part of the broader natural environment and in relation to its socio-economic environment. A key aspect is integrating the management of the different water uses into one approach. This can be done by looking at management as a set of functions, influencing the basin (in this case Tai Lake Basin). Three functions can be distinguished, namely Planning,

Operational Management and Analytical Support. Figure 1 shows a representation of the IBM-framework.

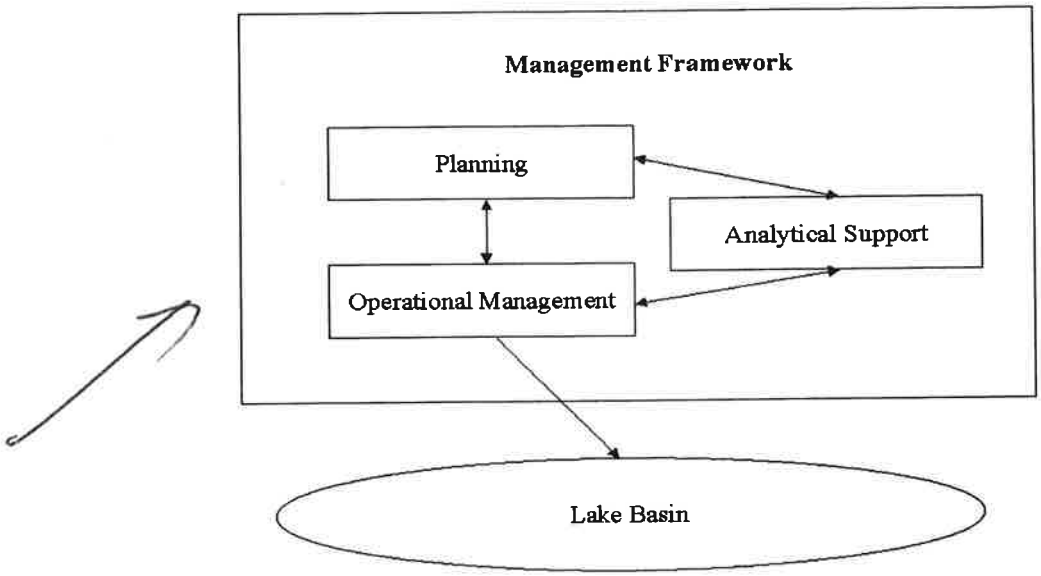

Figure 6 : Integrated Basin Management

Planning supports Operational Management, by offering orientation and priorities to it. This is mainly done by plans and legal rules. Operational Management puts these plans into effect, by introducing concrete measures, e.g. building regulation works or treatment plants, or by using more indirect instruments like water use fees and other economic instruments. Analytical Support is necessary to support both Planning and Operational Management. Its main function is to provide relevant and up to date information, in order to enable Planning to set the right goals, and Operational Management to assess the influence of its measures.

For technical measures (as to be proposed in the Engineering Report), the Operational Management function is the most relevant. For the Masterplan itself, Planning is the relevant function. The other two deliverables, the Data Collection Report and the Water Quality Model, best fit in the Analytical Support function. Using the Integrated Basin Management framework, these deliverables can easily be related to each other. What is shown here is a simple version of the framework, which is to be worked out during the Masterplan study (e.g. by including the specific roles of involved parties in it, or specific measures proposed).

4.1.3 Task Groups

In this paragraph a short introduction will be given to the different Task Groups and the approach which will be used to reach the Task Groups' objectives.

4.1.3.1 Task Group I - Water Quality

The main goal for the Masterplan is to formulate recommendations for improving water quality in Lake Tai. Since the water quality and ecology is influenced by many factors, it is not easy to evaluate the effects of control measures. The activities of the Task Group include data collection, building a Water Quality model, using this model to evaluate different scenarios, and to formulate recommendations for improving the water quality of Lake Tai.

What is the task of the workgroup besides the 4 planned task groups.

4.1.3.2 *Task Group II - Wastewater management*

The Task Group Wastewater Management is responsible for the Engineering Study. Helped by Chinese counterpart organisations, an analysis will be made of the waste water management situation in the Taihu Basin, and the effect of previous plans on this situation will be evaluated. Furthermore, a prioritisation will be made of urgent technical investments, aiming to improve the water quality situation of Lake Tai on short-term notice.

4.1.3.3 *Task Group III - Socio-economic and institutional aspects*

This Task Group will mainly act as a supplier of information to the other Task Groups, especially regarding socio-economic information. The aim of these activities is mainly to assess possible pollution abatement measures on their socio-economic impacts, in order to make it possible for decision makers to make a balanced choice for specific measures. The institutional research provides information on international practices to Chinese decision makers and ideas for solving possible current short-term problems in the management of Lake Tai.

4.1.3.4 *Task Group IV - Training & Transfer of Knowledge*

In the Masterplan Lake Tai project many experts from different backgrounds will be working together. The Task Group Training & Transfer of Knowledge will provide training and study visits to both Chinese professionals and officials, in order to create more understanding of integrated lake management.

4.1.4 Boundary conditions and limitations

In each study there are several limitations and boundary conditions. The first limitation to be considered is that of time: the study should be finished within 24 months. This time-limit naturally puts constrains on the amount of aspects taken into consideration. The clearest boundary is formed by the project area. Taihu Basin is under the management of three provinces (Jiangsu, Zhejiang and Anhui) and the city of Shanghai. For the purpose of this Masterplan study, however, the boundary of the concerned area includes the provinces of Jiangsu and Zhejiang and the Municipality of Shanghai only. The boundary for data collection includes the following areas: Lake Tai water body, its upstream region and some major inflow and outflow rivers such as the Wangyu and Taipu Rivers.

Other boundary conditions are formed by plans and policies that are in effect already and have to be taken into account. Apart from various state laws and regulations on water management, the most important concrete government policy plan regarding Lake Tai is the Taihu Water Pollution Control and Prevention Plan for the Ninth five year and 2010. It has been approved by the state council, and should be considered as binding. This study aims at providing input for the Tenth five year plan, and therefore will also take into account the Ninth five year plan as well. Other plans existing on regional and local levels will be considered where appropriate.

4.2 Task Group I - Water Quality

The Water Quality Study will be carried out by the Task Group Water Quality, consisting of team members from Grontmij from the Dutch side, in collaboration with several organisations from the Chinese side, namely the Nanjing Institute for Environmental Science (NIES), Taihu Basin Water Resources Protection Bureau (TBWRPB), Jiangsu Environmental Protection Bureau (EPB), Zhejiang Environmental Monitoring Station and Wuxi EPB, as allocated by SEPA.

4.2.1 Problem description

The water in Lake Tai is polluted, and the Masterplan intends to provide recommendations for solving this. To study the effectiveness of proposed measures (and evaluate the measures carried out to date), insight is needed in the different processes in the lake that affect its water quality.

4.2.2 Objectives

The overall objective for the water quality study is the evaluation of control measures for improving water quality of Lake Tai for the Masterplan. At the end of the Water Quality Study a set of control measures is to be defined that should result in a water quality that meets the Chinese standards.

The following sub-objectives can be distinguished:
1. to identify and collect the data necessary for analysing the water quality of Lake Tai
2. to build a water quality model
3. to evaluate possible control measures for improving the water quality of Lake Tai by using the water quality model
4. to recommend a set of control measures that will improve the water quality of Lake Tai to meet the Chinese standards

4.2.3 Activities

For an accurate evaluation proper insight in the functioning (hydrological, ecological and water quality) of the lake is needed. An effective way to evaluate different scenarios is building a Water Quality model. Using this model, different scenarios (in which possible measures are integrated) can be calculated, in order to establish a set of alternative measures for reducing the pollution of Lake Tai.
The project activities for the Task Group Water Quality can be divided in 5 phases, as described below.

Phase	Activities
1. project planning	1. plan of approach for the Water Quality Study
2. data collection:	2. data inventory
	3. data collection and evaluation; formulation of additional data and research requirements
	4. additional data collection / research
3. Building Water Quality model	5. interpreting and processing data
	6. defining water quality descriptions
	7. building water quantity model
	8. building water quality model
	9. calibration and validation of the models
4. Evaluation of control measures	10. formulating possible control measures
	11. choosing realistic scenarios
	12. calculating effects of scenarios
5. Reporting and recommendation	13. recommending measures and incorporation of findings in Masterplan

The Chinese counterparts will collect the necessary data. Interpretation and evaluation of this data will be carried out by Grontmij and the Chinese counterparts jointly. For the interpretation of the data Grontmij will build a simple Water Quality model. This model also quickly gives insight in the relevant processes. NIES (together with Grontmij) will build the definite Water Quality model, if possible on the basis of existing models. TBWRPB's River Network Model will be used as input to the Water Quality model of Lake Tai. Without this quantitative basis, the results of water quality modelling would be far less reliable. Also during scenario calculations the inputs of the TBWRPB's models will be needed. Below, the above-mentioned phases will be described into more detail.

4.2.3.1 Phase 1: Project planning

Activity 1: Plan of approach for the Water Quality Study
Based on the Grontmij proposal for the Masterplan project, consultation with SEPA, and the mission to the project area in November 2000, a plan of approach for the Water Quality Study is prepared. This inception report entails this plan of approach.

Responsible organisation: Grontmij in consultation with SEPA and NIES
Time period: September 2000 - December 2000

4.2.3.2 Phase 2: Data collection

Activity 2: Data inventory
Available data is being inventorised by the Chinese counterparts. It is important to find out which organisations collect which information, what parameters are measured using which methods and sampling frequencies, and so on. This inventory will result in a Data Collection Report (by each counterpart organisation involved).

Data collection:
- Overview meteorological data collection:
  - map meteorological stations;
  - type of data collected;
  - measuring frequency.
- Overview monitoring water quantity programmes:
  - map of discharge measuring points;
  - map of level measuring points;
  - measuring frequencies and measuring methods.
- Overview monitoring water quality programmes:
  - map of sample points;
  - sampling frequencies and parameters measured;
  - sampling and analysing methods.
- Overview ecology monitoring programmes:
  - list of monitored species;
  - map of monitoring locations;
  - monitoring frequencies and monitoring methods.
- Overview research:
  - ecological research, ecological relations, food web relations;
  - nutrient cycling research, distribution through food web;
  - sediment-water exchange research;
  - ecotoxicological research.

Methodology:
- review of existing monitoring programmes;
- review of research completed and/or in progress.

Responsible organisations: Nanjing Institute for Environmental Science, Jiangsu EPB, Zhejiang Environmental Monitoring Station, Taihu Basin Water Resources Protection Bureau and Wuxi EPB
Time period: September 2000 - February 2001

Activity 3: Data collection and evaluation; formulation of additional data and research requirements
After the inventory, the data should actually be collected and merged in a workable (English, spreadsheet) format by the Chinese counterparts, after which the data can be evaluated by the Task Group. This data collection includes monitoring results, but also previous research and model building activities.

Data collection:
- For minimal monitoring data requirements of the Water Quality model, see Annex 2;
- Previous research and model building activities: detailed overview of work done and results achieved.

Methodology:
- gathering monitoring programme data;
- putting data in spreadsheets;
- providing reports/papers on previous research work.

Responsible organisations: Nanjing Institute for Environmental Science, Jiangsu EPB, Zhejiang Environmental Monitoring Station, Taihu Basin Water Resources Protection Bureau and Wuxi EPB (data collection); Grontmij (data evaluation)
Time period: February 2001 - May 2001

Activity 4: Additional data collection and research
As a result of the previous activity it will become clear whether additional data collection (or further research in those fields where no data is currently available) will be necessary. Examples of this could be collecting and analysing additional samples, but also research into the run-off rates of pollutants. On basis of the Technical Meeting in November the Task Group expects that especially on the fields of sediment-water relations and non-point sources further research will be needed. For the latter, additional research should make it possible to express the discharge of non-point sources in discharge/ha/year for each specific land use[1].
Additional data collection will continue during the further course of the project, providing the Task Group and counterpart organisations with up-to-date data.

Responsible organisations: Nanjing Institute for Environmental Science, Jiangsu EPB, Zhejiang Environmental Monitoring Station, Taihu Basin Water Resources Protection Bureau and Wuxi EPB
Time period: May 2001 - end project

4.2.3.3 Phase 3: Building Water Quality model

Activity 5: Interpreting and processing data
After (and during) the data collection, the data (delivered in spreadsheet format) will be interpreted and processed into a format that can be used for the Water Quality model. After interpretation and processing one reference year will be chosen as base for the modelling.

Responsible organisation: Grontmij

[1] In order to calculate the socio-economic effects of control measures it is necessary to determine the exact land use (among others: types of industry, size, crop type) of the studied areas. So the precise study locations must be defined and described. See also paragraph 4.4.3

Time period: April 2001 - July 2001

Activity 6: Defining water quality descriptions
The interpretation of the collected data results in a determination of the most important processes for water quality and ecology. These processes will be transformed into mathematical relations for the model.

Responsible organisation: Grontmij and NIES
Time period: May 2001 - December 2001

Activity 7: Building water quantity model
As a basis for any water quality model an accurate water quantity balance is needed. To achieve this with the required accuracy, a water quantity model for Lake Tai will be developed. The base for this water quantity model will we the output of the river models that are available at TBWRPB. Levels will be calibrated with the levels measured by TBWRPB. The output of the river models will be combined with the meteorological data (precipitation and evaporation).

Responsible organisation for water quantity modelling of the rivers: TBWRPB.
Responsible organisation for water quality modelling of the lake: NIES (in co-operation with Grontmij)
Time period: May 2001- December 2001

Activity 8: Building water quality model
On basis of the acquired information, a comprehensive Water Quality model for Lake Tai will be built. This model should incorporate at least:

- 2D flow model,
- effects of wind driven currents,
- wave formation and resuspension of sediments due to waves,
- resuspension due to boats,
- nutrient chemistry
- algae growth
- food web relations
- sediment-water exchanges.

Responsible organisation: NIES (in co-operation with Grontmij)
Time period: June 2001 - March 2002

Activity 9: Calibration and validation of the models
Calibration should be carried out with the concentration development of the sampling sites within the lake for the reference year (which has yet to be chosen - see activity 5). After calibration the model should fit the monitoring data of a year not used for calibration (validation).

Responsible organisation: NIES (in co-operation with Grontmij)
Time period: January 2002 - May 2002

4.2.3.4 Phase 4: Evaluation of control measures

Activity 10: Formulating possible control measures
It is now possible to formulate control measures with possible desired consequences for the water quality of the lake. During workshops and other studies potential control measures for improving water quality will be listed.

Methodology:
- workshops
- additional research outcomes

Responsible organisation: Grontmij, in co-operation with Chinese counterpart organisations.
Time period: September 2001 - March 2002

Activity 11: Choosing realistic scenarios
On basis of the possible control measures scenarios will be selected.

Responsible organisation: Grontmij and NIES.
Time period: December 2001 - April 2002

Activity 12: Calculating effects of scenarios
The scenarios will be calculated in the Water Quality model (with input from the TBWRPB's River Network Model).

Responsible organisations: NIES and TBWRPB, in co-operation with Grontmij
Time period: February 2002 - July 2002

4.2.3.5 Phase 5: Reporting and recommendation

Activity 13: Recommending measures and incorporation of findings in Masterplan
The findings of the Water Quality Study will be presented in a final report, and incorporated in the Masterplan.

Responsible organisation: Grontmij
Time period: June - September 2002

4.2.4 Time period

The period of the Water Quality Study is from September 1st 2000 to September 1st 2002, and consists of the following time periods:
- Phase 1 September 2000 - December 2000
- Phase 2 November 2000 - May 2000 (and continuing)
- Phase 3 February 2001 - February 2002
- Phase 4 February 2002 - June 2002
- Phase 5 June 2002 - September 2002

4.2.5 Scope

The scope of the project is limited to the water quality and ecology of Lake Tai itself. So the Water Quality model will be limited to the lake itself. Description of control measures to improve water quality and ecology in the lake however will not be limited to the lake only since external input of the lake is very important for water quality in the lake.

4.2.6 Expected outcome

The water quality study will have the following expected outcomes:

- The data collection phase will result in a complete data set of lake Tai. This data set will be suitable for building and calibrating an water quality model
- The model building phase will result in a calibrated water quality model, suitable for calculating and evaluating control measures.
- This will result in a set of realistic recommendations to improve water quality in lake Tai in such a way that it should meet the Chinese standards.

4.3 Task Group II - Wastewater Management

The Engineering Study will be carried out by the Task Group Wastewater Management, consisting of team members from Grontmij (supported by a Chinese MSc participant) from the Dutch side, in collaboration with the Jiangsu Provincial EPB (Environmental Protection Bureau) and Zhejiang Monitoring Station from the Chinese side (as allocated by SEPA).

4.3.1 Problem description

Organic substances and nutrients from untreated domestic and industrial wastewater discharges contribute to the pollution of Lake Taihu. Current pollution control efforts, i.e. wastewater treatment plants, are extensive but hampered by economical, technical and institutional constraints.

4.3.2 Objectives

The overall objective of the Engineering Study is to recommend and prioritise engineering projects regarding wastewater treatment to assist local governments in decision making. The following sub-objectives can be distinguished:

- to identify the sources, amount and characteristics of domestic and industrial wastewater;
- to evaluate the performance of the wastewater treatment measures after the implementation of phases 1 and 2 of the Ninth 5-year and Year 2010 Taihu Catchment Pollution Control and Prevention Plans;
- to propose feasible wastewater treatment methods suitable for the specified sources;
- to recommend priority projects for wastewater treatment to reduce the wastewater pollution of Lake Taihu.

4.3.3 Activities

The outcome of the engineering study will provide an overview of the total pollution load from domestic and industrial wastewater to Lake Taihu and the achievable pollution

load reduction resulting from wastewater treatment measures. Referring to the project objectives, the following project phases can be distinguished:

Phase	Outcome
1. project planning	1. plan of approach for the engineering study
2. data collection: existing situation and pollution load	2. sources, amount and characteristics of domestic and industrial wastewater 3. institutional, regulatory and financial framework 4. performance of the existing wastewater treatment measures 5. total current pollution load
3. study: proposed treatment technologies and achievable pollution load reduction	6. advanced N and P removal methods 7. feasible treatment technologies for specified wastewater sources 8. pollution load after implementation of wastewater treatment measures
4. recommendation: priority cleaning-up projects	9. recommendation for approximately three priority projects
5. reporting	10. final report

In the following sections, the project activities are presented in more detail.

4.3.3.1 Phase 1: Project planning

Activity 1: Plan of approach for the engineering study.
Based on the Grontmij proposal for the Masterplan project, consultation with SEPA, a mission to the project area in November 2000, and a preliminary inventory of wastewater data, a plan of approach for the engineering study is prepared by Grontmij and SEPA. This inception report entails this plan of approach.

Responsible organisation: Grontmij in consultation with SEPA
Time period: September 2000 - December 2000

4.3.3.2 Phase 2: Existing situation and pollution load

Activity 2: Determine the sources, amount and characteristics of domestic and industrial wastewater in the Lake Taihu Basin.
Data collection:

- number of people/cities, water consumption/capita
- number and type of industry
- amount and characteristics of domestic wastewater (as much as possible specific for neighbourhoods)
- amount and characteristics of industrial wastewater (as much as possible specific for types of industry)
- map of project area: urban areas, industry areas and location of the major polluting enterprises, sewer lines, surface waters
- sanitation practices and collection systems (population served, night soil, sewerage)
- existing sewer system: where, type (separate or combined), year of construction, point of discharge
- method of discharge - pre-treatment (e.g., septic tanks, settling, infiltration)
- building codes, design, costs for pre-treatment (e.g., septic tanks)
- plus the prognosis for the development of the above data

Methodology:
- collection of existing data available at provincial and municipal agencies
- data assembling, classification of sources
- English translation and reporting

Responsible organisation: Jiangsu Provincial EPB and Zhejiang Monitoring Station
Time period: January 2001 - March 2001

Activity 3: Describe the institutional, regulatory and financial framework for wastewater treatment in Lake Taihu Basin
Data collection:
- regulatory framework (e.g., standards)
- institutional set-up: organisation responsible for design, construction and operation of sewer systems and treatment plants
- technical know-how and managerial capacity
- financial feasibility: costs for collection and treatment, investment budget, price of water; fees (water and/or discharge)
- scope for cleaner production (water saving and re-use in industry)

Methodology:
- description of already available information at national, provincial and local agencies

Responsible organisation: Jiangsu Provincial EPB and Zhejiang Monitoring Station
Time period: April 2001

Activity 4: Evaluate the performance of the wastewater treatment measures after the implementation of phases 1 and 2 of the Ninth 5-year and Year 2010 Taihu Catchment Pollution Control and Prevention Plans.
Data collection:
- the number of domestic wastewater treatment plants planned in the 2010 action plan (if already determined: system, planned capacity, responsible agency)
- the number of domestic wastewater treatment plants under construction by the end of 2000 (system, design capacity)
- the number of domestic wastewater treatment plants in operation by the end of 2000 (location, system, design capacity, influent load and actual treatment performance, responsible agency)
- the number of industrial wastewater treatment plants in operation by the end of 2000 (location, system, design capacity and treatment performance, discharge quantities)
- the achieved treatment performance and effluent quality by the established domestic and industrial wastewater treatment plants in terms of pollution load reduction (organic and nutrients)

Methodology:
- review of the 2010 action plan
- interviews with agencies responsible for planning and building the domestic wastewater treatment plants (local construction bureau's)
- visits to the built domestic wastewater treatment plants to collect the figures on treatment performance and effluent quality
- monitoring check: influent - effluent composite sample and laboratory analyses at three domestic wastewater treatment plants

- collect data on industrial wastewater treatment plants from licenses and monitoring data from EPBs
- visits to a few industrial wastewater treatment plants of relevant industrial sectors (e.g., paper, textile and leather, food processing, chemical sector)
- reporting

Responsible organisation: Grontmij with Chinese MSc participant, Jiangsu Provincial EPB and Zhejiang Monitoring Station
Time period: January - March 2001

Activity 5: Estimate the total current pollution load to Lake Taihu from domestic and industrial wastewater.
The estimation will be based on the determined pollution load taking into account the current pollution load reduction achieved by the already implemented wastewater treatment measures.

Responsible organisation: Grontmij
Time period: April 2001 - May 2001

4.3.3.3 Phase 3: Proposed treatment technologies and achievable pollution load reduction

Activity 6: Make designs for the upgrading of existing municipal wastewater treatment plants for advanced N and P removal
With regard to the eutrophication problem of Lake Taihu, advanced levels of nutrient removal in the wastewater treatment systems are desirable. In this activity, research will be done to investigate and design methods that improve the N and P removal of the existing wastewater treatment systems.

Methodology:
- select 3 municipal wastewater treatment plants (big, medium and small) to be investigated in detail
- monitoring check and analyse the N and P removal performance
- review of literature on and experiences with advanced N and P removal methods
- propose designs for N and P upgrading of existing treatment plants (design parameters and design drawings with emphasis on process technology and hydraulics)
- consult findings with wastewater treatment staff
- present findings in MSc thesis report in the Netherlands

Responsible organisation: Grontmij with Chinese MSc participant
Time period: March 2001 - June 2001
Activity 7: Propose feasible treatment technologies for specified wastewater sources
For several kinds of wastewater sources (e.g., from a specific industry type or a neighbourhood with certain sewerage conditions) specific wastewater treatment technologies will be recommended, see Table 4.1.

Table 4.1: Recommended treatment technologies specified for different wastewater sources

relevant wastewater source	feasible treatment technology	achievable pollution load reduction (in %)
e.g., neighbourhood with septic tanks and central sewerage	e.g., activated sludge system	e.g., 80% BOD/COD, 70% N & P
e.g., large-scale paper industry	etc.	
etc.		

Methodology:
- Grontmij mission to China (June 2001)
- determine the *relevant* wastewater sources
- define criteria to assess the feasibility of wastewater treatment technologies with regard to the application in the Lake Taihu Basin (technical, institutional and financial feasibility criteria)
- propose feasible treatment technologies for relevant wastewater sources (including as well cleaner production options aimed at prevention of wastewater)
- estimate the achievable pollution load reduction

Responsible organisation: Grontmij with Chinese MSc participant, and Jiangsu Provincial EPB and Zhejiang Monitoring Station
Time period: April 2001 - July 2001

Activity 8: Estimate the total pollution load to Lake Taihu from domestic and industrial wastewater after the implementation of wastewater treatment measures
In this activity, the contribution of the implementation of wastewater treatment methods in the reduction of the pollution load to Lake Taihu will be estimated and used as an input to the Masterplan study.

Methodology:
- for each source of wastewater, the achievable pollution load reduction can be estimated as a result of the application of the proposed treatment technology, see Table 4.2.
- from this, the total wastewater load to Lake Taihu after the implementation of wastewater treatment measures can be estimated.

Table 4.2: Achievable pollution load reduction through wastewater treatment for specified wastewater sources

relevant wastewater sources	total wastewater load in Lake Taihu Basin (BOD, COD, N & P)	total pollution load reduction achievable through wastewater treatment
e.g., paper sector		
total		

Responsible organisation: Grontmij
Time period: July 2001 - August 2001

4.3.3.4 Phase 4: Priority cleaning-up projects

Activity 9: Recommend short-term interventions and priority projects for wastewater treatment
Finally, based on the study on wastewater sources, feasible treatment technologies and advanced nutrient removal methods, recommendations for priority demonstration projects will be done.

Methodology:
- propose approximately 5 priority projects based on the study results
- interactive workshop: team mission to China
- present findings of the engineering study and select 3 priority projects
- prepare the basic design for the selected 3 priority projects

Basin of Lake.

- consult with World Bank / ADB and fine tune with other initiatives

Responsible organisation: Grontmij with Jiangsu Provincial EPB and Zhejiang Monitoring Station
Time period: August 2001 - September 2001

4.3.3.5 *Phase 5: Reporting*

Activity 10: Final report
Methodology:
- reporting of the results of the engineering study in view of the Masterplan study.

Responsible organisation: Grontmij
Time period: September 2001 - November 2001

4.3.4 Time period

The period of the Engineering Study is from 1-9-00 till 30-11-01, and consists of the following 5 time periods:

- Phase 1 September 2000 - December 2000
- Phase 2 January 2001 - April 2001
- Phase 3 March 2001 - August 2001
- Phase 4 August 2001 - September 2001
- Phase 5 September 2001 - November 2001

4.3.5 Scope

The scope of the study is limited to the domestic and industrial wastewater sources, and does not take into account diffuse sources such as from agricultural runoff. Note: in China, small sources of pollution, discharging less than 100 kg COD/d, are considered non-point sources. Focus is on the relevant sources, among others in terms of feasible pollution control efforts applicable for these sources. The study area is the Lake Taihu Basin catchment area.

4.3.6 Expected outcome

The engineering study will result in an overview of:
- the sources, amount and characteristics of domestic and industrial wastewater in the Lake Taihu Basin;
- the performance of the wastewater treatment measures after the implementation of phases 1 and 2 of the Ninth 5-year and Year 2010 Taihu Catchment Pollution Control and Prevention Plans;
- feasible wastewater treatment systems for specified sources of domestic and industrial wastewater;
- recommended short-term interventions and priority projects for wastewater treatment.

From this overview, the following can be established:
- current pollution load to Lake Taihu from domestic and industrial wastewater, including the current pollution load reduction achieved by the already implemented wastewater treatment measures;

- the total pollution load reduction achievable through additional wastewater treatment interventions.

The outcome of the engineering study will thus on one hand be used as an input in the water quality modelling assessment done in the Masterplan study.

On the other hand, the outcome of the engineering study will result in the recommendation of priority demonstration projects for wastewater treatment for which financial support can be requested from international agencies such as the World Bank / ADB.

4.4 Task Group III - Socio-economic and Institutional Aspects

The socio-economic and institutional analyses in this project will be carried out by the Task Group Socio-economic and Institutional Aspects, consisting of team members from Grontmij and IHE-Delft on the Dutch side, in collaboration with Renmin University of China and SEPA on the Chinese side.
Two separate, but inter-related sets of activities can be distinguished: those focussing on socio-economic data and analysis, and those focussing on institutional aspects.

4.4.1 Problem description

The present water quality situation of Lake Tai is the result of socio-economic activities in the area. On the other hand, all technical measures to be taken to improve the water quality of Lake Tai have socio-economic implications. Taking these activities and implications into account is therefore an important part of the Masterplan study.
Water quality improvement measures are to be carried out by institutions active in the water management of Lake Tai, and they will be inflicted on the users of the Lake. It is therefore necessary to find out whether the current institutional framework can cope with the effective implementation, and enforcement of such measures, and will be able to monitor their effects.

4.4.2 Objectives

The overall objective of the Socio-economic and Institutional Study is to provide information and analysis regarding significant socio-economic and institutional implications of actions proposed in the Masterplan. The following sub-objectives can be distinguished:

Socio-economic study:
- to provide relevant socio-economic data and analysis for the other Task Groups, to enable these groups to make more balanced decisions on recommending alternative measures to improve the water quality of Lake Tai;
- to investigate important socio-economic aspects of the Masterplan Study in general regarding policy and implementation.

Institutional study:
- to provide relevant institutional data for other Task Groups;
- to provide relevant information on international practices of water management, in particular those related to the change-over from a state-planned to a more market-oriented economic system;

- to provide recommendations for short-term measures to alleviate current problems in the water management structure and practices of Lake Tai.

4.4.3 Activities Socio-economic part

Referring to the project objectives, the following four project phases can be distinguished:

Phase		Outcome	
1.	Project planning	1.	plan of approach for the socio-economic study
2.	data collection	2.	compilation of existing statistical material
3.	socio-economic research	3.	clarification of links between standard statistical information and environmental indicators
		4.	supportive research for Task Groups
		5.	additional research, on a needs basis
4.	reporting	6.	final report

The project activities are presented in more detail in the next sections.

4.4.3.1 Phase 1: Project planning

Activity 1: Plan of approach for the socio-economic study
This part of the inception report sets out the plan of approach for the socio-economic studies. It is based on the original Grontmij proposal for the Masterplan project, subsequent consultation with SEPA, and a short mission of members of the Dutch team to the project area in November 2000.

Responsible organisation: Grontmij and SEPA, in consultation with Renmin University
Time period: September 2000 - December 2000

4.4.3.2 Phase 2 : Data collection

Activity 2: Compilation of existing statistical material
The main objective is to obtain a more complete and also more consistent set of statistical data on the diverse set of pollution components from the major sectors of economic activities.

Data collection:

- Collection of statistical materials on Taihu Basin regarding population characteristics, land use and main economic activities by sector in the recent period, at levels of dis-aggregation and in spatial format as to be compatible with area-based pollution loads in the region (on city, town and rural district basis).
- Population growth trends and projections for geographic localities. If there is great uncertainty about migrations trends, to be expected in a highly dynamic region, both high and low range indications should be known.
- Large-scale industrial pollution: These industries are the chemical sector, the metallurgical industry, the building materials industry and the light industry (e.g. paper mills). Polluting plant sites should be linked to economic units, for instance in multi-plant economic enterprises, and their sector classification should be identified consistent with the standard Industrial Classification in current use in China to compile industrial censuses, surveys and/or Input-Output tables.

- Non-point sources may include large numbers of relatively small industrial polluters. This may require a special sample study to be undertaken, in a manner consistent with the sector classification emerging from the inventory of large polluters.
- Agriculture: pollution loads per hectare for major agricultural crops. A sub-division may be needed for farmers using different technologies and high external input levels, and those using low external input levels.
- Household sector: Household level pollution levels for different rural and urban localities. The latter differentiated by income classes.

Methodology:
- Review of statistical yearbooks at national, regional and local level
- Methodological problems encountered should be discussed during the intended visit of Chinese team members to the Netherlands foreseen for May 2001.

Responsible organisation: Renmin University of China
Time period: January 2001 - March 2001

4.4.3.3 Phase 3: Socio-economic research

Activity 3: Clarification of links between standard statistical information and environmental indicators
In addition to the general data inventory to be undertaken, a special research effort may have to be undertaken in regard to getting an idea of the incidence of the non-point polluters

In environmental studies it is customary to determine pollution levels on an area based grid system. This is obvious to assess the degree of aggregate pollution and to be able to ascertain different pollution and their possible interaction for clean-up activities. The procedure is from the areas based concept to identify the polluters of the sites concerned. This method of analysis is generally inconsistent with the manner in which socio-economic statistics are collected and processed.

It is important to be able to effectively link polluted sites to responsible polluters and to the normal set of enterprise level statistics concerned. Especially the size distribution of polluters by (sub) sector is important, as larger enterprises may have greater opportunity to comply with sector level anti-pollution measures, due to size, internal economics of scale and economic strength.

In the Masterplan Study it will be especially relevant for the relation between pollution load per hectare and economic activities per hectare (for industry and agriculture) to have coherence and consistency between data sources. Although for point sources this relation is made easily, e.g. by getting company information from the list of largest polluters in the area (and relating this to the ISIC classification of industries and input/output tables), the establishment of such a relation for non-point sources needs special research.

A possible solution for this problem of possibly different data sets is to co-ordinate and/or combine the specific non-point sources research of NIES with research on socio-economic indicators in the sample areas used for this research. Co-ordination between NIES and Renmin University is therefore desired. The sample design for establishing polluted areas needs to be the sample frame for establishing the non-point polluters by economic activity.

Data collection:

- To establish the relation between socio-economic and environmental indicators for specific areas of the sample survey study, e.g. pollution loads for different land uses, urban-rural (and income class) differences in environmental behaviour of households
- To integrate the results of the special sample survey for non-point polluters with the broader data availability in the initial data inventory, as discussed above.

Methodology:
- Co-operation in research activities on non-point sources between NIES and Renmin University
- Additional sampling for specific unresolved areas (e.g. population/company samples).

Responsible organisation: Renmin University of China
Time period: May 2001 - May 2002

Activity 4: Supportive research for Task Groups
Research among others:
- cost-effectiveness analyses of proposed measures;
- options for cost-recovery of proposed measures;
- valuation of proposed measures on socio-economic indicators (e.g. influence on public health, employment rates, economic implications for companies)

Methodology:
- dependant on type or research, always in co-operation with relevant Task Groups

Responsible organisation: Renmin University of China assisted by Grontmij
Time period: June 2001 - June 2002

Activity 5: Additional research
Depending on the need, additional socio-economic research may be desirable. Possible topics include a more detailed study on financing of pollution abatement measures or implications of pollution on public health.

Responsible organisation: Renmin University of China and Grontmij
Time period: September 2001 - June 2002

4.4.3.4 Phase 4: reporting

Activity 5: final report
The findings of the socio-economic part will be incorporated in the Masterplan.

Responsible organisation: Grontmij
Time period: July 2002 - September 2002

4.4.4 Activities Institutional part

Integrated Basin Management, as described previously in this chapter, includes three management functions, namely Planning, Operational Management and Analytical support. In this section an overview will be given of what the institutional aspects for the Masterplan study will consist of. First of all the desired deliverables will be presented,

which form the basis for the proposed approach. This approach is divided into four phases, each consisting of a number of activities.

During the technical meeting in November 2000, and the follow-up in Beijing, the principal and the consultant reached agreement over the desired deliverables for the institutional part of the study. These are:

1. A description of the institutional frameworks of China, the Netherlands and perhaps one or more other (European) countries: comparison and explanation of the differences.
2. Information on the possible changes in the administrative water management structure of China because of a transition from planned to market-oriented management system: strengths and weaknesses of different systems.
3. Options for short-term solving of current problems in the water management structure of Lake Tai.

The first deliverable is mainly meant as a reference for Chinese decision makers, and will serve more to generate ideas for, rather than become an integral part of the Masterplan. Descriptions of different systems provide an overview of different possibilities for water management structures. Furthermore, the description of the Chinese framework will provide the Dutch experts with necessary information for continuing with the other steps of the study.
Deliverable 2 is included because the transition from a planned to a market-oriented water management is now an important issue in China. Information from countries that have undergone similar changes, ideas can be presented on how one might proceed with this issue in China.
The third deliverable is of direct relevance to the Taihu region. Using insights from the previous aspect studies, the water management system of the Taihu basin will be investigated. According to the principal, some problems exist in the water management structure of Lake Tai, for which short-term solutions are to be found.

Referring to the project deliverables, five phases can be identified.

Phase		Outcome	
1.	project planning	1.	plan of approach for the institutional study
2.	data collection	2.	data collection
		3.	description of general water management structure in China
		4.	additional data collection
3.	international practices and long-term development	5.	description of international water management frameworks and ideas for long-term development of Chinese water management system
4.	analysis of water management of Lake Tai	6.	local data collection
		7.	identifying key organisations
		8.	workshop on water management issues
		9.	additional research
5.	reporting	10.	final report

In the following sections, the project activities are presented in more detail.

4.4.4.1 Phase 1: Project planning

Activity 1: Plan of approach for the institutional study.
Based on the Grontmij proposal for the Masterplan project, consultation with SEPA, and a mission to the project area in November 2000, a plan of approach for the socio-economic study is prepared by Grontmij and SEPA. This inception report entails this plan of approach.

Responsible organisations: Grontmij and SEPA, in consultation with Renmin University
Time period: September - December 2000

4.4.4.2 Phase 2: Data collection

Activity 2: Data collection
This activity will primarily produce reference material for the study and provide a basic idea of the water management structure in China for general understanding.

Data collection:
- Planning function:
  - Relevant policies on environmental protection in general and water management in particular (plans like the Taihu Basin Water Resources Protection Plan, The Ninth Five-Year Plan, the Three rivers, three lakes policy, etc); Summary and translation
  - Relevant national laws and decrees; Summary and translation
  - Relevant regional and local legislature, plans, procedures: Summary (and translation where necessary)
  - Overview of national, regional and local decision makers; description of tasks and responsibilities
- Operational Management function:
  - Overview of national, regional and local organisations with managing tasks and competencies; description of tasks and responsibilities; description of relations with other organisations;
  - Overview of budget flows to and from these organisations, and the budget allocation criteria concerning these organisations;
  - Overview of available instruments to influence lake and users (including data on results and effectiveness or instruments if available)
  - Overview of relevant users and other stakeholders
- Analytical Support function:
  - Overview of research institutes and other information service providers
  - Overview of instruments used to provide information services (e.g. monitoring systems, land registry systems)

Methodology:
- review of relevant literature, policy documents and legislature

The management framework should consist of all organisations on national, regional and local level which have something to do with water management. An initial survey made clear that on national level the decision-making organisations directly involved are SEPA, the Ministry of Water Resources, the Ministry of Construction, the Ministry of Agriculture, the Ministry of Transport, and the State Forest Administration. More general ministries like the Ministry of Finance may also have some competencies in this field. On regional and local level even more different organisations are active, which usually however fall under the scope of one of the ministries mentioned. The formal tasks and competencies of these organisations should be clear in order to understand the system.

The outcomes of this phase are a report consisting of a schematic of the Chinese water management system, a description (including tasks, responsibilities and main instruments) of the organisations in this management system, and a summary / translation of the relevant policy documents and laws.
Responsible organisation: Renmin University of China
Time period: January - May 2001

Activity 3: Additional data collection
After the data collection phase, a workshop is scheduled in the Netherlands. During this workshop (which will take place during the Study Visit, scheduled in May 2001) the results of the data collection will be discussed on the basis of the report presented by the Chinese experts. On the basis of this workshop data requirements may arise, for which additional data collection can be necessary.

Responsible organisation: Renmin University of China
Time period: May - September 2001

4.4.4.3 Phase 3: International practices and long-term development

Activity 4: description of international water management frameworks and ideas for long-term development of Chinese water management system
A report will be written which will describe the institutional frameworks in the Netherlands and one or more other countries. It is suggested that one of these countries should be one which recently underwent a transition from a planned to a market-oriented water management system, such as Poland. Systems in other countries (e.g. Britain, France or Philippines) can be described as well in order to provide insight in the different ways water management can be organised. These descriptions will form the basis into a discussion of possible ways to transform the Chinese system into a more market-oriented system as well.

Instead of drafting a full scenario (which can only be very general), it is suggested to focus on several areas (to be identified), such as the building and operation of Waste Water Treatment Plants using private investments, or a discharge fee system in accordance with market prices. Such focus areas should be selected by the consultant and the principal together during the course of the project, in order to best fulfil the information need of the principal.

Responsible organisation: Grontmij
Time period: May 2001 - September 2001

4.4.4.4 Phase 4: Analysis of the water management of Lake Tai

Activity 5: Local data collection
Data collection will comprise of identifying all institutions in the Taihu Basin which have a relation with the water management of the Lake.

Data collection:
- for each organisation among others:
  - tasks and responsibilities
  - place in hierarchy
  - budget sources
  - relations with other organisations
  - instruments at disposal
  - specific interests

Methodology:
- based on a standard data sheet, to be developed by the Task Group

Responsible organisation: Renmin University of China
Time period: May 2001 - December 2001

Activity 6: Identifying key organisations
Because of the large number of organisations involved, it may be necessary to select some key organisations for a workshop. The identification of these organisations can be done on basis of the gathered data sheets, where appropriate interviews can be held to establish more information. This activity should result in a workable number of organisations, which are crucial to effective management of Lake Tai.

Responsible organisation: Grontmij and Renmin University of China, in consultation with organisations involved
Time period: December 2001 - February 2002

Activity 7: Workshop on water management issues
A workshop will be organised together with the key organisations (and of which all other organisations will be informed). The purpose of the workshop is to reach agreement over possible problems in the water management of Lake Tai, and to find solutions for such problems. If possible, this workshop could be divided into two parts, some time in between to create better results and to provide the possibility for more feedback from the different organisations.

Responsible organisation: Grontmij and organisations in China
Time period: March 2002

Activity 8: Additional research
On basis of the workshop results, it is possible that additional research may be necessary. This can be in the form of additional workshops, desk studies or visits. Further specification will occur during the course of the project.

Responsible organisation: Renmin University of China and Grontmij
Time period: March 2002 - June 2002

4.4.4.5 Phase 5: Reporting

Activity 9: final report
As mentioned in the introduction, a large part of the task group's work will consist of providing information to other task groups. Socio-economic and institutional data will therefore appear throughout the Masterplan, as this is not an issue which can be seen independently from the other tasks. However, proposed solutions by e.g. the Water Quality task group should be implemented by Chinese institutions. In order to facilitate this, the Management System of Lake Tai has been investigated during Phase 3. The results of this study will appear as such in the Masterplan, together with long-term ideas for Chinese water management in general. Next to the Masterplan, also the other reports produced (e.g. the report on water management in an international context) will provide information to the decision makers.

Responsible organisation: Grontmij
Time period: July 2002 - September 2002

4.4.5 Time period

The period of the Socio-economic and Institutional Study is from September 1st 2000 till September 1st 2002, and consists of the following periods:

Socio-economic part:
- Phase 1: September 2000 - December 2000
- Phase 2: January 2000 - March 2001
- Phase 3: May 2001 - June 2002
- Phase 4: June 2000 - September 2002

Institutional part
- Phase 1: September 2000 - December 2000
- Phase 2: January 2001 - September 2001
- Phase 3: May 2001 - September 2001
- Phase 4: May 2001 - June 2002
- Phase 5: July 2002 - September 2002

4.4.6 Scope

To define the scope of the Task Group's activities accurately, some assumptions have been made:
- The (national) Chinese legal and administrative framework (i.e. the different laws and organisations present) will be regarded as constant entities for the short term. Changes in these can occur on the longer term, as a result of changes taking place independent of the project. For the short-term analysis of the institutional framework in the Taihu area these are not taken into account.
- The main unit of analysis will be the separate organisations involved. Especially on regional and local level individual departments in organisations will not be considered, as this will make the analysis too complex for the given timeframe.

4.4.7 Expected outcome

The socio-economic study will result in:
- knowledge of relevant socio-economic impacts of the different measures proposed in the Masterplan;
- Detailed knowledge of desired socio-economic aspects (yet to be defined).

The institutional study will result in:
- An overview of water management practices in several countries;
- Ideas for the long-term transition from a planned towards a market oriented water management organisation in China;
- Recommendations for solving possible short-term problems in the management of Lake Tai.

4.5 Task Group IV - Training & Transfer of knowledge

In the Masterplan Study many people from the various partners are involved. Since they come from different disciplines and have different educational backgrounds, a tailor-made course for the Chinese partners in the Masterplan Study will be designed and executed. As a matter of fact two courses will be given: one course for Chinese

professionals and one course for Chinese officials. The two courses will however have common elements.

This training will be carried out by the Task Group Training & Transfer of Knowledge, lead by IHE-Delft and supported by Grontmij. The Chinese counterpart for the training organisation is the State Environmental Protection Administration (SEPA).

4.5.1 Problem description

The professionals participating in the Masterplan Lake Tai project originate from many different Chinese organisations and they have various backgrounds. Although many of them have a good knowledge about lake ecosystems and about Taihu in particular, not everybody has knowledge about all aspects. Therefore a short course on lake ecosystems and lake management for the professionals participating in the project is proposed.

The Government officials participating in this project do not always have full knowledge about lake ecosystems and the management of lakes. A study tour to the Netherlands, where relevant Dutch organisations can be visited and ideas can be exchanged about different methods of lake management is therefore also proposed.

4.5.2 Objectives

The overall objective of the Training is to increase the knowledge of the participants in the field of lake ecosystems and lake management.

4.5.3 Activities

IHE-Delft, in co-operation with Grontmij, will organise a training and a study tour in May 2001. The following parts can be distinguished:

- A four-week training for Chinese professionals, concentrating on technical aspects of lake management. This training will consist of lectures, a role-play and various field visits and excursions.
- A two week study tour and training for Chinese officials, consisting of visits to Dutch Government institutes and other organisations, field visits and attendance of the presentations of the role-play (part of the professional training).

Besides these specific courses, training on the job will be taking place during the whole course of the project, for example:

- exchange of knowledge during workshops;
- Chinese technicians co-working in the Netherlands;
- Dutch missions to China.

4.5.3.1 Activity 1: Training for Chinese professionals

The course will consist of lectures, a role-play and field visits/excursions. In co-operation with SEPA and based on the background of the course participants, lectures to be given will be selected. Reference is made to the information material (IHE-Delft brochures) which were handed over during the Technical Meeting, and contain a good overview of lecture possibilities.

It should be noted that the participants of the training should have a good working knowledge of the English language. For the training organisers, it is important to obtain a

list of proposed participants, including their affiliation, position, and (very important) their educational background.

4.5.3.2 *Activity 2: Study tour and Training for Chinese officials*

The study tour and training will consist of visits to various institutions, field excursions and attendance of the role-play.

Organisations to be visited and field trips will be selected in co-operation with SEPA, and include organisations involved in lake and river management, for instance:

Organisations
- Netherlands Ministry of Transport, Public Works and Water Management
- Netherlands Ministry of Housing, Land-use planning and the Environment
- Institute for Inland Water Management and Waste Water Treatment RIZA
- National Institute of Public Health and the Environment
- Water Board
- Provincial and municipal authority
- Monitoring station and aquatic laboratory

Field trips related to river and lake management
- Lake IJssel
- Easter Scheldt Flood Protection Works
- Millingerwaard (river project)

4.5.4 Time period

The period of the training is from May 1st 2001 until May 31st 2001, and consists of the following two time periods:
- May 1 - May 25 2001: Training for the professionals
- May 21 - May 31: Study tour and training for the officials

5 Project organisation and responsibilities

5.1 Project Organisation

5.1.1 Project Team

The Project Team consists of both Chinese and Dutch specialists. In order to efficiently carry out the work and facilitate effective communication between relevant specialists from both sides, a project team has been formed. The team members consist of Dutch specialists and their respective Chinese counterparts as listed below.

Role	Dutch Side (Organisation)	Chinese Side (Organisation)
Project Management Team		
Project Director	Mr. Ben Misero (Grontmij)	Ms. Yang Xiao Ling (SEPA)
Project Manager	Mr. Enrico Moens (Grontmij)	Mr. Wu Yue (SEPA)
Project Co-ordinator	Ms. Wendy Tao (Grontmij)	Mr. Chen Yong Qin (SEPA)
Project Administrator	Mr. Erwin de Bruin (Grontmij)	Ms. Cao Ying (SEPA)
Task Group Leaders		
Water Quality	Mr. Mario Maessen (Grontmij)	Mr Zhang Yongchun (NIES) Mr Huang Yibin (Jiangsu EPB) Mr Wang Xiaoquan (Zhejiang EPB)
Wastewater Management	Mr. Hillebrand Ehrenburg (Grontmij)	Mr Wang Jun (Jiangsu EPB) Mr Wang Xiaoquan (Zhejiang EPB)
Socio-economic / Institutional Aspects	Mr. Aart van de Laar (IHE-Delft)	Mr. Guojun Song (Renmin University)
Training & Transfer of Knowledge	Mr. Hans van Bruggen (IHE – Delft)	Mr Chen Yong Qin (SEPA)

The project team forms the core group for the study. The team will be supported by specialists and technicians from both Grontmij and IHE-Delft, as well as by partner organisations in China. An overview of the project organisation is presented below.

As can be seen in the overview, the Task Groups from both Chinese and Dutch sides will be in direct contact with each other trough the Task Group leaders. The Project Management and the Task Group Leaders together form the Core Team for the Study.

5.1.2 Involved institutes

The institutes involved in the study from Chinese side are:

- State Environmental Protection Administration (SEPA)
- Nanjing Institute for Environmental Sciences (NIES)
- Renmin University, Institute of Environmental Economy
- Taihu Basin Water Resources Protection Bureau (TWRPB)
- Jiangsu Environmental Protection Bureau (Jiangsu International Environmental Development Center - IEDC)
- Zhejiang Environmental Monitoring Centre (Zhejiang EMC)

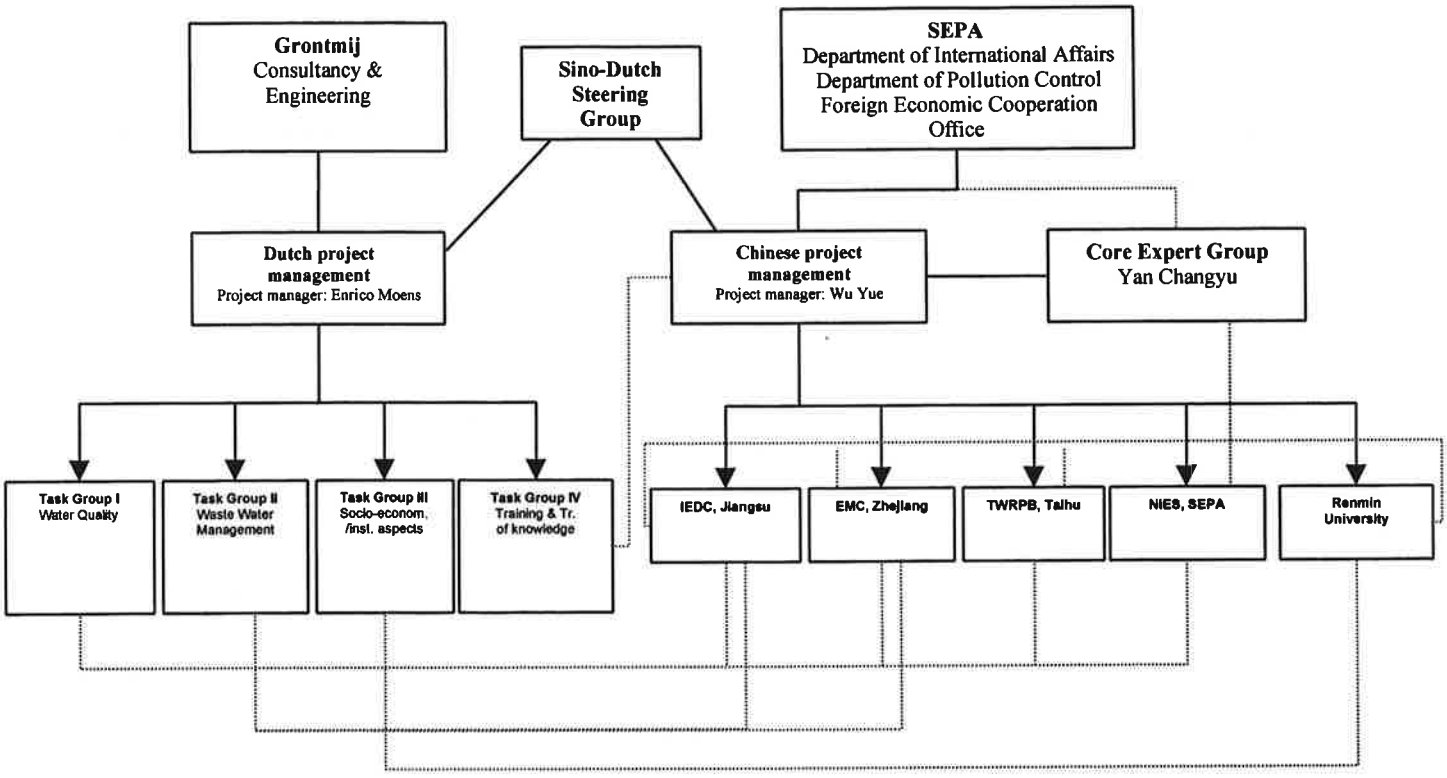

Figure 7 : Project organisation

5.1.3 Steering Group

The project is under the supervision of a project Steering Group. The Steering Group consists of both Chinese and Dutch specialists who have been appointed by the China State Environmental Protection Administration and the Dutch Environmental Impact Analysis Commission respectively. The steering group members are:

Chinese side:

- Mr. Lu Xinyuan, Director General of the Pollution Control Department of SEPA
- Ms. dr. Liu Hongzhi, Director of the Pollution Control Department of SEPA
- Mr. Zhong Xiaodong, Deputy director of International Cooperation Department of SEPA

Dutch side:

- Mr. Prof. dr. Dick de Zeeuw, deputy chairman of the EIA-Commission of the Netherlands
- Mr. Simon Groot, senior expert on water quality, modelling and institutional setting
- Mr. Joop de Schutter, senior expert on integrated water management and ecology
- Mr. Arend Kolhoff, technical secretary of the Commission

5.1.4 Core Expert Group

On Chinese side, a Core Expert Group has been formed to provide technical advice to the local organisations and SEPA. Not all members have been officially named yet, but among others Mr Yan Changyu, a consultant from the Department of Water Affairs, Chinese Institute of Environmental Science and Research, will be member of this group.

5.2 Tasks and responsibilities

This section gives an overview which institute is responsible for which activity. In Annex 3 an even more specific overview will be given for each involved institute in separate Terms of Reference.

5.2.1 Task Group 1 - Water Quality

The work activities of the Task Group Water Quality consist of the collection of water quantity, water quality and ecological data of the lake, the construction of a water quality model and the evaluation of control measures with this water quality model.

5.2.1.1 Deliverables

The results of the activities are planned according to the following schedule:

- 28 February 2001: Data collection reports (by NIES, Jiangsu EPB, Zhejiang Monitoring Station, TBWRPB and Wuxi EPB)
- 1 May 2001: Data spreadsheets (by Jiangsu EPB, Zhejiang Monitoring Station, TBWRPB and Wuxi EPB)
- 1 May 2002: Results river network model (by TBWRPB)
- 1 May 2002: Final report non-point sources (by NIES)
- 1 June 2002: Calibrated water quality model (by NIES)
- 1 August 2002: Results scenario calculations (by NIES and TBWRPB)
- 30 September 2002: Masterplan (by Grontmij)

5.2.1.2 Responsibilities

The responsibilities of the different institutes are described in the Terms of Reference, to be found in Annex 3. Data collection will be carried out by all institutes involved, while the Water Quality model is primarily built by NIES (in co-operation with Grontmij). Vital information to the model - and later scenario analyses - will be provided by TBWRPB from its River Network Model.

5.2.2 Task Group 2 - Wastewater Management

The work activities of the Task Group Wastewater Management consist of data collection, evaluation of the undertaken efforts in the field of waste water management, and a prioritisation of possible waste water management technologies and concrete investment proposals. Counterpart organisations for the Group are Jiangsu Provincial EPB and Zhejiang Monitoring Station.

5.2.2.1 Deliverables

The results of the activities are planned according to the following schedule:

- 28 February: draft report on the sources, amount and characteristics of domestic and industrial wastewater
- 15 March 2001: final report on the performance of the industrial wastewater treatment measures
- 31 March 2001: final report on the sources, amount and characteristics of domestic and industrial wastewater
- 30 April 2001: final report on the institutional, regulatory and financial framework for wastewater treatment
- 30 November 2001: Engineering Report

5.2.2.2 *Responsibilities*

The responsibilities of the different institutes are described in the Terms of Reference, to be found in Annex 3. Responsibility for data collection (and delivery of above-mentioned deliverables) lies with Jiangsu Provincial EPB and Zhejiang Monitoring Station.

5.2.3 Task Group 3 - Socio-economic and Institutional Aspects

The work activities of the Task Group Socio-economic and Institutional Aspects consist of data collection and analysis of socio-economic and institutional aspects. Renmin University of China is the counterpart organisation for the Task Group.

5.2.3.1 *Deliverables*

The results of the activities are planned according to the following schedule:

- 28 February 2001: Data Collection Report on socio-economic and institutional aspects: preliminary overview of available statistical and institutional data (by Renmin University);
- 1 April 2001: Socio-economic information report (results of Activity 2 of Socio-economic study) (by Renmin University);
- 15 April 2001: Report on Chinese Water Management Framework (results of Activity 2 of Institutional study) (by Renmin University);
- 1 September 2001: Report on international practices in water management (by Grontmij);
- 1 May 2002: Report on links between standard statistical information and environmental indicators (by Renmin University);
- 30 September 2002: Masterplan (by Grontmij).

5.2.3.2 *Responsibilities*

The responsibilities of the different institutes are described in the Terms of Reference, to be found in Annex 3. Responsibility for data collection and specific research in China lies with Renmin University, special topics of interest will be covered jointly by Grontmij and Renmin University.

5.2.4 Task Group 4 - Training & Transfer of Knowledge

The work activity of the Task Group Training & Transfer of Knowledge primarily consist of the organisation of 2 trainings / study visits, one for professionals and one for officials, to take place in May 2001. The counterpart organisation is SEPA.

5.2.4.1 *Deliverables*

One deliverable can be distinguished:

- 15 February 2001: List of training participants (including further information as specified in the Terms of Reference in Annex 3) (by SEPA)

5.2.4.2 *Responsibilities*

The responsibilities of SEPA regarding Training aspects are described in the Terms of Reference, to be found in Annex 3. This primarily consists of the selection of participants and the provision of participant details to IHE-Delft. IHE-Delft, together with Grontmij, is responsible for the organisation of the trainings and study visits.

5.3 Time schedule

An overall time schedule is presented below. In annex 4 the full time schedule is given.

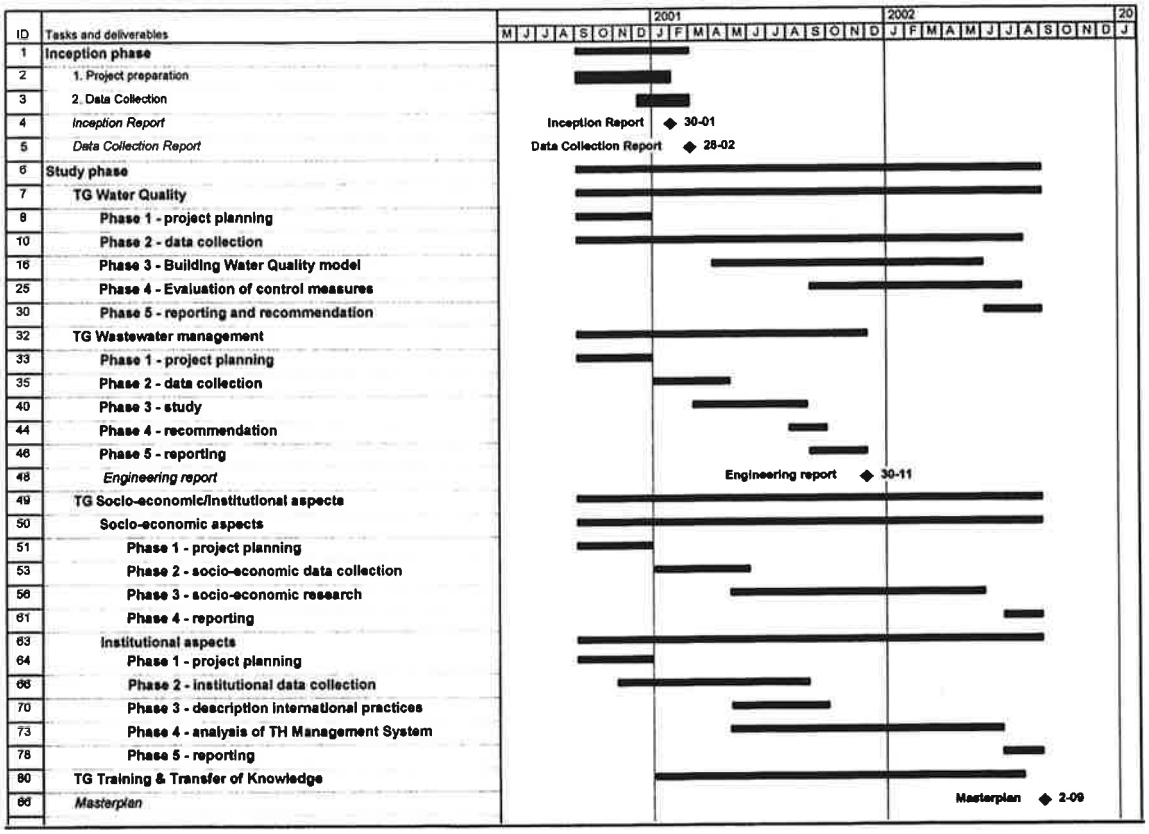

Figure 8 : Summarised project time schedule

References

ADB (1996), *Summary Environmental Impact Assessment and Summary Initial Environmental Examination for Anhui Environmental Improvement Project in People's Republic of China*

ADB (2000), *Reform of environmental and land legislation in the People's Republic of China*

Grontmij, IHE & Arcadis (1999), *Rehabilitation of Taihu Lake, China P.R. Project Identification for Cluster Financing.*

IHE (1999), *Integrated Water Management for the Taihu Lake Basin (China P.R.)*, participants report.

Lu S. (1998), Cleaner Production - The Key to Implementing Shanghai's Sustainable Development Strategy, *UNEP Industry and Environment*, July - September, pp 48-50.

Min, K. (n.y.), Wastewater Pollution in China, www.darwin.bio.uci.edu

Mudde, L. (2000), www.evd.nl

NEPA, SPC & SETC (1997), *China Trans-Century Green Project.*

SEPA (n.y.), *Urban Environmental Management in China.*

Taihu Basin Authority *et al* (2000), *Atlas of ecology and environment of the Taihu Lake*

Tao, Y.X. & P. Hills (1999), Assessment of Alternative Wastewater Treatment Approaches in Guangzhou, China, *Water, Science & Technology* 39, no 5, pp 227-234.

U.S. Commercial Service (2000), Sewage Treatment, www.usatrade.gov

Vermeer, E.B. (1998), Industrial Pollution in China and Remedial Policies, *China Quarterly*, pp 952-985.

Warren, K.A., L. Ortolano & S. Rozelle (1999), Pollution Prevention Incentives and Responses in Chinese Firms, *Environmental Impact Assessment Review 19*, pp 521-540.

Warwick, M. (1999), *Implementation of China's 'Three Rivers, Three Lakes Program in the Lake Tai Basin.*

WRI (n.y.), China's Health and Environment: Water Scarcity, Water Pollution, and Health, www.igc.org/wri

Xiangcan J. (1995), *Lakes in China.*

Annexes

Annex 1: Programme Technical Meeting

Programme and participant list of the Technical Meeting in November 2000

Annex 2: Preliminary Results Data Collection

2.1 Detailed overview preliminary data collection
2.2 Minimal monitoring data requirements for Water Quality model

Annex 3: Terms of Reference for counterpart organisations

3.1 Terms of Reference Jiangsu Provincial EPB and Zhejiang Monitoring Station (Task Group Wastewater Management)
3.2 Terms of Reference Nanjing Institute for Environmental Science, Jiangsu Provincial EPB, Zhejiang Monitoring Station, Taihu Water Resources Protection Bureau and Wuxi EPB (Task Group Water Quality)
3.3 Terms of Reference Renmin University of China (Task Group Socio-economic and Institutional Aspects)
3.4 Terms of Reference State Environmental Protection Administration (Task Group Training & Transfer of Knowledge)

Annex 4: Time schedule

Specific time schedule of the different project phases.

Annex 5: Chinese partner organisations

An overview of the Chinese partner organisations and a presentation of their activities.

Annex 1

Programme Technical Meeting

Annex 1 Programme and participants technical meeting

Programme of the Technical Meeting

Day 1

8.30 - 8.45	Introduction
8.45 - 9.05	Opening Speech by Mr. Xiao (Zhejiang Province).
9.05 - 9.20	Speech by Mr. Kong (SEPA)
9.20 - 9.40	Speech by Mr. Moens (Grontmij)
9.40 - 10.00	Short break
10.00-11.30	Introduction of the project by SEPA/Grontmij
11.45-14.00	Lunch
14.00-15.00	Experiences of Water Management Netherlands
15.00- 16.00	Experiences field trip Taihu (video)
16.00- 16.15	Short Break
16.15 - 17.45	Example of Lake Rehabilitation

Day 2

8.30 - 9.15	Water Quality Management by Mr. Maessen
9.15 - 10.00	Waste Water Treatment by Mr. Ehrenburg
10.00-10.15	Short Break
10.15-11.15	Monitoring Work by Mr. Huang (Wuxi)
11.15-12.00	Monitoring Work by Mr. Wang (Zhejiang)
12.00-14.00	Lunch
14.00-14.15	Introduction Workshop
14.15-16.00	Subgroup discussions
16.00-16.15	Short Break
16.15-17.30	Subgroup Discussion

Day 3

8.30 - 9.45	Training and Transfer of Knowledge (IHE)
9.45 - 10.30	Experiences on Taihu area
10.30-10.45	Short Break
10.45-11.30	Water Quality Modelling (AquaSense)
11.30-12.00	Socio-Economic/Institutional Aspects
12.00-14.00	Lunch
14.00-1445	Introduction of Master plan by Mr. Zhang (NIES)
14.45-15.00	Contents of Master Plan
15.00-16.00	Subgroup discussions
16.00-16.15	Short Break
16.15-17.30	Subgroup discussions and conclusions

Day 4

8.30 - 8.40	Introduction
8.40 - 9.00	Overview on Water Quality
9.00 - 9.20	Impressions on Waste Water Management
9.20 - 9.40	Possibilities Training & Transfer of Knowledge
9.40 - 10.00	Socio-Economic/Institutional Aspects
10.00-10.15	Short Break
10.15-10.35	Task Allocation
10.35-11.15	Closing Speech by Grontmij
11.15-11.35	Closing Speech by Zhejiang EPB
11.35-12.00	Group photo
12.00-14.30	Closing Lunch

Participants to the Technical meeting

NAME	ORGANISATION	POSITION
Liu Chun Yun	FECO, SEPA	Deputy Director
He Xiao Yun	Zhejiang Env. Monitoring Centre, Management Division	Deputy division head
Wang Xiao Quan	Zhejiang Env. Monitoring Centre	Deputy director
Yue Jie	Zhejiang Env. Monitoring Centre	Senior Engineer
Fang Luxiang	Zhejiang Env. Monitoring Centre, Water Quality Testing Division	Deputy division head
Zhu Xiao Dan	Zhejiang Env. Monitoring Centre	Engineer
Liu Jian Ming	Zhejiang Env. Monitoring Centre	Engineer
Mou Yong Ming	Zhejiang Env. Monitoring Centre	Engineer
Hua Yong Zhong	Wuxi EPB	Deputy Director
Wu Zhi Jian	Wuxi Env. Monitoring Centre	Deputy Director
Zhang Hu Jun	Wuxi Env. Monitoring Centre	
Wang Hua	Taihu Basin Water Resource Protection Bureau	Engineer
Wang Jun	Jiangsu EPB, Foreign Affairs &Economy Dept	
Zhang Yong Chun	Nanjing Env. Science Research Institute	Assistant Director
Song Guo Jun	Reming University, Institute of Env. Economy	Ass. Professor
Ye De Chang	Zhangjiang River Catchment Water Resource Protection Bureau, Shanghai Branch	Senior Engineer
Xiao Jun	Zhijiang EPB	Deputy Director
Kong Li	Pollution Control- Water Division, SEPA	
Han Yi	Zhijiang EPB, International Cooperation Office	Interpretor
Li Wei Xin	Nanjing Env. Science Research Institute	Deputy Division Head
Yie Hai	Nanjing Env. Science Research Institute	Ass. Research fellow
Zhao Zhi Qiang	Nanjing Env. Science Research Institute	Engineer
Zhang Ji Ren	Nanjing Env. Science Research Institute	Ass. Research fellow
Wu Zhi Lin	Nanjing Env. Science Research Institute	Ass. Research fellow
Zhang Yi Ming	Nanjing Env. Science Research Institute	Ass. Research fellow
Zhang Jianhua	Water Resource Dept, Nanjing	Engineer
Chen Weiming	Nanjing Institute for Geography and Limnology (NIGL), Wuxi Monitoring Station	Director

Annex 2

Preliminary results data collection

Annex 2

2.1 Overview preliminary data collection

In the table below an overview will be given of the preliminary results of the data collection phase. This overview will be finalised in the data collection report, to be delivered by the counterpart organisations on 28 February 2001.

Project categories and aspects	Data availability	Remarks
1. general		
1.1. (hydrological) boundaries project area	Not yet defined	Detailed study has to be carried out on the eastern side, boundary very diffuse, especially in the Taipu region
1.2. geographical description	Printed maps, not digitally available now Satellite pictures existing, not available now	no detailed digital maps available Detailed map water system (1:400000) at TBA;
1.3. geological description	soil types: map existing (SSI), scale unknown	no detailed digital maps available
1.4. meteorological data	NIGLAS, 1 weather station northern shoreline	more stations existing, data to be obtained
1.5. land use	sattelite images available, to be obtained	no digital data available
1.6. water functions	Zhejiang province, Jiangsu Province	
2. water quantity		
2.1. overview of water resources in project area	TBA	only daily river levels available
2.2. in/outflow lake	TBA	most important rivers in water quantity model 18 incoming rivers, daily levels Inlet grand canal → Tai Hu, May -September, daily levels Outlet Tai Hu (south-east), May-September, daily levels
2.3. water quantity model surrounding rivers	TBA	most important rivers in model
2.4. water quality model Lake Tai	NIES	under construction by NIES, more details needed
3. water quality		
3.1. water quality lake	Wuxi-EPB	1998-now 20 sampling points in lake, frequency 1/month parameters, O_2, COD, BOD, NH_4^+ , NO_3^-, t-N, *o*-PO_4^{3-}, t-P, pH, EC, Temp, depth, Secchi depth, Chl-a, Na, K, Ca, Mg, Cl^-, frequency 1/y, heavy metals Also special project sampling. 22 sampling points outside lake, Jiangsu province frequency 1/month parameters, O_2, COD, BOD, NH_4^+ , NO_3^-, t-N, *o*-PO_4^{3-}, t-P, pH, EC, Temp, depth,
	Zejiang province	1998-now 6 sampling points in the rivers. 12/y to 6/y :COD, pH, O_2,NH_4^+ ,temp, t-P, phenol 1/y :heavy metals
	NIGL	1991-now 1 transect, 9 sampling points from Wuxi to middle of lake, frequency 1/month 5 other sampling points, spread over lake, frequency 4/y Parameters, roughly same as Wuxi-EPB
	TBA	1997-now 24 sampling points in the lake, frequency 1/month 35 sampling points in rivers, frequency 1/month both 15 parameters
3.2. water quality incoming rivers	see previous	minor rivers not sampled

3.3. sediment	Wuxi-EPB NIGL TBA	same points as in the lake, frequency 1/y occasionally occasionally
3.4. ecological data	Wuxi-EPB Zhejiang Province EPB NIGL TBA	summertime, 1/y, algae composition, abundancy at intake points, sanitary bacteria, 6/y bacteria at drinking water intake, 6/y all points algae composition, abundancy, zooplankton 1/month all points benthos, macrophytes 1/y Fishery: only rough estimates Fish surveys, 1962-1965, estimates later Vegetation survey, 1/3y whole lake Soma data, not exactly known
3.5. sediment-water interaction	TBA NIGL	Laboratory experiments on exchange rates Sediment traps, estimation nutrients, grain size, mass spectrometry
3.6. water quality model surrounding rivers	TBA	TBA model has water quality aspects
3.7. water quality model Lake Tai	NIES	under construction
4. pollution discharge sources		
4.1. point sources	Wuxi-EPB Zhejiang province EPB	1035 point sources suspected, 60% actually found. Location by combination factory lists and tax pay 257 point sources found
4.2. non-point sources (< 100 kg BOD/day)	Zhejiang province EPB Academy of Science Nanjing, Soil Science Academy Counties Industries	Rough estimates overall runoff 1995 Probable source for data Yearbooks products, livestock, fresh water products, use of fertiliser, fruits tourism. Annual reports
5. waste and waste water management		specific research for this aspect is necessary, data collection could not be carried out.
5.1. inventory of sewer systems in project area		
5.2. methods of waste water discharge/treatment in places without sewer systems		
5.3. inventory of wastewater treatment plants		
5.4. solid waste discharge, dumpsites		
6. socio-economic aspects		
6.1. economic development	National, provincial and local governments	available in yearbooks
6.2. population growth and distribution	National, provincial and local governments	available in yearbooks
7. institutional aspects		
7.1. boundaries of administrative regions	to be made	
7.2. overview of actors involved in water management, relations and functions	to be made	specific research necessary
7.3. competencies of actors, available instruments	to be made	specific research necessary
7.4. overview of existing laws, plans and policies	to be made	specific research necessary

2.2 Minimal monitoring data requirements for Water Quality Model

In the Inception Report data collection requirements have been given. These are partially (but not solely) based on the minimal requirements for building a water quality model. These minimal requirements are given below. As building the water quality model is not the only activity of the Task Group Water Quality, this does not suggest that only these data are needed. The inclusion of this list is only meant to provide insight in the information needed for the modelling work.

Category	Data type	Parameter	Details	Required (minimal) size	resolution
Morfology	Map	A geographical map with depth profiles and indication where all the water inputs and outputs occur.		from hydrological model	
Hydrology	Time series	All water inputs and outputs , including seepage, and upwelling of ground water.	(m3 per hour or any other time unit)	year	week
Hydrology	Time series	Rainfall		year	day
Hydrology	Time series	Evaporation		year	week (day is better)
Hydrology	Time series	Water levels.		year	week
Incoming substances	Time series	Nitrogen	NH4	year	month
Incoming substances	Time series	Nitrogen	N-Kjeldahl	year	month
Incoming substances	Time series	Nitrogen	NO3	year	month
Incoming substances	Time series	Nitrogen	dissolved organic nitrogen (DON).	year	month
Incoming substances	Time series	Phosphorus	PO4	year	month
Incoming substances	Time series	Phosphorus	total phosphorus.	year	month
Incoming substances	Time series	Carbon	Biological oxygen demand (BOD)	year	month
Incoming substances	Time series	Carbon	Chemical oxygen demand (COD)	year	month
Incoming substances	Time series	Carbon	Dissoved organic carbon (DOC).	year	month
Incoming substances	Time series	Silicium	SiO3.	year	month
Incoming substances	Time series	Anorganic particles	Ash weight.	year	month
Incoming substances	Time series	Organic particles	Ashfree dryweight.	year	month
Incoming substances	Time series	Algae	Chlorofyl	year	month
Incoming substances	Time series	Conservative substance	Chloride.	year	month
Incoming substances	Time series	Oxygen	Oxygen.	year	month
Incoming substances	Time series	Fish	if relevant	year	month
Temperature balance	Time series	water temperature in all inputs		year	day
Temperature balance	Time series	Minimum and maximum or averaged air temperature		year	day
Temperature balance	Time series	Total irradiation		year	day
Temperature balance	Time series	Averaged wind velocity and direction		year	day
Temperature balance	Time series	Maximum wind velocity		year	day
Lake measurements	Time series	Relative air humidity		year	day
Lake measurements	Time series	Nitrogen	NH4	year	month
Lake measurements	Time series	Nitrogen	N-Kjeldahl	year	month
Lake measurements	Time series	Nitrogen	NO3	year	month
Lake measurements	Time series	Nitrogen	dissolved organic nitrogen (DON).	year	month
Lake measurements	Time series	Phosphorus	PO4	year	month
Lake measurements	Time series	Phosphorus	total phosphorus.	year	month
Lake measurements	Time series	Carbon	Biological oxygen demand (BOD)	year	month
Lake measurements	Time series	Carbon	Chemical oxygen demand (COD)	year	month
Lake measurements	Time series	Carbon	Dissoved organic carbon (DOC).	year	month
Lake measurements	Time series	Silicium	SiO3.	year	month
Lake measurements	Time series	Anorganic particles	Ash weight.	year	month
Lake measurements	Time series	Organic particles	Ashfree dryweight.	year	month
Lake measurements	Time series	Oxygen	Oxygen.	year	month
Lake measurements	Time series	Algae composition	cyanobacteria, diatoms and other algal groups.	year	month
Lake measurements	Time series	Zooplankton biomass and composition	dominant groups.	year	month
Lake measurements	Time series	Conservative substance	Chloride.	year	month
Lake measurements	Time series	Bottom organisms biomass	midget larvae and mussels if relevant.	year	month
Lake measurements	Time series	Fish	most abundant species	year	month
Lake measurements	Time series	Water temperatures	one depth	year	month
Sediment:	Map	Composition with respect to total phosphorus, particulate organic carbon, iron, magnesium and nitrogen		>10 locations distributed over lake	
Sediment:	Map	Data on phosphorus release		>10 locations distributed over lake	
Sediment:	Map	Bottom type		>10 locations distributed over lake	

Annex 3

Terms of Reference for counterpart organisations

Terms of Reference

Nanjing Institute for Environmental Science, Jiangsu Provincial EPB, Zheijang Monitoring Station, Taihu Water Resources Protection Bureau and Wuxi EPB.

Water Quality Study (13.4690.1/40.3)

Masterplan Lake Tai project, Task Group Water Quality.

Grontmij Group
Houten, 21 augustus 2001

Contents

1 Introduction

1.1 Water Quality Study

The Masterplan Lake Tai project is based on an integrated approach for sustainable lake management. It is a collaboration between Grontmij Consulting Engineers (The Netherlands) and SEPA (State Environmental Protection Administration, China). The project basically includes two parts: the short-term Cleaning-up Programme (Phase 1) and the long-term Master Plan Study (Phase 2). As a part of this Masterplan a Water Quality Study will be carried out, which is meant to provide insight in the effectiveness of proposed measures to improve the water quality of Lake Tai.

The Water Quality Study will be carried out by the Task Group Water Quality, consisting of team members from Grontmij from the Dutch side, in collaboration with several organisations from the Chinese side, namely Jiangsu Environmental Protection Bureau (EPB), Wuxi EPB, Zheijang Environmental Monitoring Station, Taihu Basin Water Resources Protection Bureau (THBWRPB) and the Nanjing Institute for Environmental Science (NIES), as allocated by SEPA.

In the next chapter, the terms of references (ToR) for these organisations are described. This chapter gives a general overview of the overall Water Quality Study objectives and activities.

1.2 Problem description

The water in Lake Tai is polluted, and the Masterplan intends to provide recommendations for solving this. To study the effectiveness of proposed measures (and evaluate the measures carried out to date), insight is needed in the different processes in the lake that affect its water quality.

1.3 Objectives

The overall objective for the water quality study is the evaluation of control measures for improving water quality of Lake Tai for the Masterplan as described above. At the end of the water quality study a set of control measures has to be defined that result in a water quality that meets the Chinese standards.

The following sub-objectives can be distinguished:

1. to identify and collect the data necessary for analysing the water quality of Lake Tai
2. to build a water quality model
3. to evaluate possible control measures for improving the water quality of Lake Tai by using the water quality model
4. to recommend a set of control measures that will improve the water quality of Lake Tai to meet the Chinese standards

For an accurate evaluation proper insight in the functioning (hydrological, ecological and water quality) of the lake is needed. An effective way to evaluate different scenarios is building a water quality model. Using this model, different scenarios (in which possible measures are integrated) can be

calculated, in order to establish a set of alternative measures for reducing the pollution of Lake Tai.

1.4 Project activities

The project activities can be divided in 6 phases, as described below.

Phase	Activities
1. project planning	1. plan of approach for the Water Quality Study
2. data collection:	2. data inventory
	3. data collection and evaluation; formulation of additional data and research requirements
	4. additional data collection / research
3. Building Water Quality model	5. interpreting and processing data
	6. defining water quality descriptions
	7. building water quantity model
	8. building water quality model
	9. calibration and validation of the models
4. Evaluation of control measures	10. formulating possible control measures
	11. choosing realistic scenarios
	12. calculating effects of scenarios
5. Reporting and recommendation	13. recommending measures and incorporation of findings in Masterplan

Below, the above-mentioned phases will be described shortly.

Phase 1

In this phase, a plan of approach for the water quality study has been formulated.

Phase 2

Available data is being inventorised by the Chinese counterparts. It is important to find out which organisations collect which information, what parameters are measured using which methods and sampling frequencies, and so on. This inventory will result in a **data collection report** (by each counterpart organisation).
After the inventory, the data should actually be collected by the Chinese counterparts and merged in a workable (English, spreadsheet) format, after which the data can be evaluated by the Task Group. This data collection includes monitoring results, but also previous research and model building activities. During this stage it will become clear whether additional data collection (or further research in those fields where no data is currently available) will be necessary. Examples of this could be collecting and analysing additional samples, but also research into the run-off rates of pollutants.

Data collection will continue during the further course of the project, providing the Task Group and counterpart organisations with up-to-date data.

Phase 3

After (and during) the data collection, data will be interpreted and processed into a format that can be used for the Water Quality model. The interpretation of the collected data results in a determination of the most important processes for water quality and ecology. These processes will be transformed into mathematical relations for the model, after which the water quantity and quality model will be built. Afterwards, calibration and validation of the model should take place.

Phase 4

It is now possible to formulate control measures with possible desired consequences for the water quality of the lake. During workshops and other studies potential control measures for improving water quality will be listed. Using these measures possible scenarios will be selected. Their effects on the water quality of Lake Tai will be calculated using the model.

Phase 5

The findings of the Water Quality Study will be presented in a final report, and incorporated in the Masterplan.

1.5 Time period

The period of the Water Quality Study is from September 1st 2000 to September 1st 2002, and consists of the following time periods:

- Phase I September 2000 - December 2000
- Phase II November 2000 - May 2001 (and continuing)
- Phase III February 2001 - February 2002
- Phase IV February 2002 - June 2002
- Phase V June 2002 - September 2002

1.6 Scope

The scope of the project is limited to the water quality and ecology of lake Tai itself. So the water quality model will be limited to the lake itself. Description of control measures to improve water quality and ecology in the lake however will not be limited to the lake itself since external input of the lake is very important for water quality in the lake.

2 ToR Chinese counterparts

2.1 Introduction

For the water quality aspects in the Master Plan Lake Tai project several Chinese counterpart organisations will act as counterpart to Grontmij. The following institutes will be involved:

- NIES
- Jiangsu Provincial EPB
- Zheijang Monitoring Station
- Taihu Basin Water Resources Protection Bureau
- Wuxi EPB

The contents of support activities from the counterpart organisations are described below in their respective Terms of Reference below.

2.2 ToR Nanjing Institute for Environmental Science

2.2.1 Introduction

The Nanjing Institute for Environmental Science (NIES) is doing considerable research on the environmental protection of Lake Tai. During the Technical Meeting in November 2000 it became clear that NIES is developing a 2 dimensional water quality model for Lake Tai. Furthermore, NIES has been doing other research, among others on non-point sources. Below, the different activities required from NIES are described.

2.2.2 Activities

Phase II - activity 2 (data inventory)

In the initial stage a data collection report has to be made. The content of this report is a complete overview of existing monitoring data and research activities from 1994 till date:

- number of sampling points and their locations
- frequency of sampling
- analysed parameters
- description analytical methods
- description of research done on Lake Tai and surrounding areas, including modelling activities and research on non-point sources

The **data collection report**, containing this information (in English), is to be finished on 28 February 2001.

Phase II - Activity 4 (additional data collection/research)

At the Technical Meeting in November 2000 it became clear that too little information is available regarding non-point pollution sources. NIES will carry out research on non-point sources in the Lake Tai Basin, which will lead to a fairly accurate estimation of the non point sources in the Lake Tai basin. The annual discharge for nutrients and other important pollutants (expressed in kg/ha/year) should be estimated for several type of land use:

- non-sewered urban areas,
- non-sewered industrial areas,
- agricultural areas (for the different crop types present in the basin)

Progress in this research will be presented monthly, while the **final report on non-point sources** (in English) is to be presented on 1 May 2002.

Phase III - Building Water Quality Model
In co-operation with Grontmij NIES will develop a water quality model. This model should incorporate 2D flow model, wind driven currents, wave formation and resuspension of sediments due to waves, resuspension due to boats, nutrient chemistry, food web relations and sediment-water exchanges. Calibration should be carried out with the concentration development of the sampling sites within the lake for a whole year. After calibration the model should fit the monitoring data of a year not used for calibration (validation).

Progress in the model development will be communicated between Grontmij and NIES monthly, the delivery of the calibrated and validated model is due on 1 June 2002.

Phase IV - Activity 12 (Calculating effects of scenarios)
In co-operation with Grontmij NIES will calculate the effects of chosen scenarios using the water quality model.

Results of this calculation should be delivered on 1 August 2002.

2.2.3 Outcomes

• Data collection report	28 February 2001
• Research progress reports	monthly between Feb 2001 and May 2002
• Final report non-point sources	1 May 2002
• Delivery calibrated water quality model	1 June 2002
• Results scenario calculations	1 August 2002

2.2.4 Time allocation

• Data inventory	2 man-months
• Research on non-point sources	32 man-months
• Developing water quality model	20 man-months
• Calibration of model	10 man-months
• Scenario calculations	5 man-months

2.3 ToR Jiangsu EPB and Wuxi EPB

2.3.1 Introduction

Jiangsu Provincial EPB and Wuxi EPB have extensive monitoring programmes in Lake Tai and surrounding areas in Jiangsu province. During the Techincal Meeting in November 2000 it became clear that at least the following data are available:

- 20 existing sampling points in Lake Tai, monitoring frequency 1/month (water) and 1/year (sediment) for the following parameters:
  - O_2, COD, BOD, NH_4^+, NO_3^-, t-N, *o*-PO_4^{3-}, t-P, pH, EC, temp, depth, Secchi depth, Chl-a, Na, K, Ca, Mg, Cl^-
  - algae composition, abundancy (1/year)
  - sanitary bacteria (6/year, at intake points)
- Also special project sampling is taking place in the lake
- 22 existing sampling points outside Lake Tai (inside Jiangsu province), monitoring frequency 1/month for the following parameters:
  - O_2, COD, BOD, NH_4^+, NO_3^-, t-N, *o*-PO_4^{3-}, t-P, pH, EC, temp, depth,
- Monitoring of point sources outside the lake

These data sets could already provide a good basis for the Water Quality model, but additional data may be required. This can be established in more detail after the data evaluation has taken place. Below, the different activities required from the two EPBs are described.

2.3.2 Activities

Phase II - activity 2 (data inventory)
In the initial stage a data collection report has to be made. The content of this report is a complete overview of existing monitoring data and research activities from 1994 till date:

- number of sampling points and their locations
- frequency of sampling
- analysed parameters
- description analytical methods
- description of research done on Lake Tai, including modelling activities

The **data collection report**, containing this information (in English), is to be finished on 28 February 2001.

Phase II - Activity 3 (data collection and evaluation)
The available data will be collected by the EPBs and provided to the Task Group digitally in Microsoft Excel or another common spreadsheet format. The time period for initial data collection is from 1994 to date. The **data spreadsheets** shall be delivered on May 1, 2001.

Phase II - Activity 4 (additional data collection/research)
After the evaluation of data by the Task Group, additional data requirements may become apparent. It may be possible that additional data collection, or even specific research into relevant aspects may be required to be able to make a good Water Quality Model. Additional data collection needs are to be determined by the Task Group, in co-operation with the Chinese counterpart organisations.
Additional data collection may take place continuously during the rest of the project period. Progress in collecting additional data and the ongoing standard monitoring programmes will be presented monthly using updates in digital (spreadsheet) format or (in case of specific research) by means of reports.

2.3.3 Outcomes

• Data collection report	28 February 2001
• Delivery data spreadsheets	1 May 2001
• Digital updates additional data collection	Monthly from May 2001

2.3.4 Time allocation

• Data inventory	2 man-months
• Data collection	12 man-months
• Additional data collection/research	16 man-months

2.4 ToR Zheijang Monitoring Station

2.4.1 Introduction

Zheijang Monitoring Station has an extensive monitoring programme in Zheijang province. During the Techincal Meeting in November 2000 it became clear that at least the following data are available (from 1998 onwards):

- 6 existing sampling points in the rivers around Lake Tai for the following parameters:

- 12/year to 6/year :COD, pH, O_2,NH_4^+ , temp, t-P, phenol
- 1/year: heavy metals
- 6/year: bacteria (at drinking water intake)

- point sources outside lake
- rough estimates overall runoff (non point sources) in 1995

These data sets could already provide insight in the inflow for the Water Quality model, but additional data may be required. This can be established in more detail after the data evaluation has taken place. Below, the different activities required from the Monitoring Station are described.

2.4.2 Activities

Phase II - activity 2 (data inventory)
In the initial stage a data collection report has to be made. The content of this report is a complete overview of existing monitoring data and research activities from 1994 till date:

- number of sampling points and their locations
- frequency of sampling
- analysed parameters
- description analytical methods
- description of research done on Lake Tai and Zheijang province, including modelling activities

The **data collection report**, containing this information (in English), is to be finished on 28 February 2001.

Phase II - Activity 3 (data collection and evaluation)
The available data will be collected by the Monitoring Station and provided to the Task Group digitally in Microsoft Excel or another common spreadsheet format. The time period for initial data collection is from 1994 to date. The **data spreadsheets** shall be delivered on May 1, 2001.

Phase II - Activity 4 (additional data collection/research)
After the evaluation of data by the Task Group, additional data requirements may become apparent. It may be possible that additional data collection, or even specific research into relevant aspects may be required to be able to make a good Water Quality Model. Additional data collection needs are to be determined by the Task Group, in co-operation with the Chinese counterpart organisations.
Additional data collection may take place continuously during the rest of the project period. Progress in collecting additional data and the ongoing standard monitoring programmes will be presented monthly using updates in digital (spreadsheet) format or (in case of specific research) by means of reports.

2.4.3 Outcomes

• Data collection report	28 February 2001
• Delivery data spreadsheets	1 May 2001
• Digital updates additional data collection	Monthly from May 2001

2.4.4 Time allocation

• Data inventory	2 man-months
• Data collection	9 man-months
• Additional data collection/research	4 man-months

2.5 ToR Taihu Basin Water Resources Protection Bureau

2.5.1 Introduction

The Taihu Basin Water Resources Protection Bureau (TBWRPB) has an extensive monitoring system of Lake Tai and surrounding areas. During the Techincal Meeting in November 2000 it became clear that at least the following data are available:

- 18 incoming rivers, daily levels
- Inlet grand canal to Lake Tai, May -September, daily levels
- Outlet Lake Tai (south-east), May-September, daily levels
- from 1997 onwards:
  - 24 sampling points in the lake (frequency 1/month for 15 parameters)
  - 35 sampling points in surrounding rivers (frequency 1/month for 15 parameters)

Furthermore, TBWRPB has a running river network model (water quantity) of the most important rivers around Lake Tai. This model is very imporant for the Water Quality model, as it can provide input for it during scenario calculations. Below, the different activities required from THBWRPB are described.

2.5.2 Activities

Phase II - activity 2 (data inventory)

In the initial stage a data collection report has to be made. The content of this report is a complete overview of existing monitoring data and research activities from 1994 till date:

- number of sampling points and their locations
- frequency of sampling
- analysed parameters
- description analytical methods
- description of research done on Lake Tai and surrounding areas, including modelling activities

The **data collection report**, containing this information (in English), is to be finished on 28 February 2001.

Phase II - Activity 3 (data collection and evaluation)

The available data will be collected by THBWRPB and provided to the Task Group digitally in Microsoft Excel or another common spreadsheet format. The time period for initial data collection is from 1994 to date. The **data spreadsheets** shall be delivered on May 1, 2001.

Phase II - Activity 4 (additional data collection/research)

After the evaluation of data by the Task Group, additional data requirements may become apparent. It may be possible that additional data collection, or even specific research into relevant aspects may be required to be able to make a good Water Quality Model. Additional data collection needs are to be determined by the Task Group, in co-operation with the Chinese counterpart organisations.

Additional data collection may take place continuously during the rest of the project period. Progress in collecting additional data and the ongoing standard monitoring programmes will be presented monthly using updates in digital (spreadsheet) format or (in case of specific research) by means of reports.

Phase IV - Activity 12 (calculating effects of scenarios)

During the scenarios calculations of the developed Water Quality model, input may be required from the THBWRPB's river network model. This in-

put will be generated through calculation runs (using different scenarios) of the river network model, carried out by THBWRPB.

2.5.3 Outcomes and time schedule

• Data collection report	28 February 2001
• Delivery data spreadsheets	1 May 2001
• Digital updates additional data collection	Monthly from May 2001
• Results river network model	1 May 2002

2.5.4 Time allocation

• Data inventory	2 man-months
• Data collection	8 man-months
• Additional data collection/research	10 man-months
• River network model calculations	10 man-months

3 Planning and practical arrangements

3.1 Obligations and deliverables

All counterpart organisations will provide logistical and organisational support to the Grontmij Project Team, especially during missions to China.

All counterpart organisations will regularly (every month by email) inform Grontmij on the progress and outcome of the activities described in the ToR above.

The following deliverables will be submitted to Grontmij (in English language reports and/or appropriate digital formats):

- 28 February 2001: Data collection reports (by NIES, Jiangsu EPB, Zheijang Monitoring Station, THBWRPB and Wuxi EPB)
- 1 May 2001: Data spreadsheets (by Jiangsu EPB, Zheijang Monitoring Station, THBWRPB and Wuxi EPB)
- 1 May 2002: Results river network model (by THBWRPB)
- 1 May 2002: Final report non-point sources (by NIES)
- 1 June 2002: Calibrated water quality model (by NIES)
- 1 August 2002: Results scenario calculations (by NIES)

3.2 Grontmij project team

Project manager for the Masterplan Lake Tai project is Mr. Enrico Moens of Grontmij. Ms. Wendy Tao of Grontmij-Shanghai will act as the project co-ordinator China.

The Grontmij project team for the Water Quality Study consists of:

- Mr. Mario Maessen, project leader water quality study
- Mr. John Meulemans, co-ordinator modelling activities
- Mr. Ernst-Jan Melisie, administrator
- Mr. Zu Wei, MSc participant (Taihu Basin Water Resources Protection Bureau)

3.3 Communication

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The project number for reference is: 1346901/40.3

Terms of Reference

Jiangsu Provincial EPB and Zheijang Monitoring Station

Engineering Study (1346901/43)

Masterplan Lake Tai project, Task Group Wastewater Management

Grontmij Group
De Bilt, 21 August 2001

Contents

1 Introduction

1.1 Engineering study

The Masterplan Lake Tai project is based on an integrated approach for sustainable lake management. It is a collaboration between Grontmij Consulting Engineers (The Netherlands) and SEPA (State Environmental Protection Administration, China). The project basically includes two parts: the short-term Cleaning-up Programme (Phase 1) and the long-term Master Plan Study (Phase 2). The Cleaning-up Programme exists of an *engineering study* for clean-up and control of water pollution to solve the most urgent problems concerning water quality. This Engineering Study is the aspect under consideration in this report.

The Engineering Study will be carried out by the Task Group Wastewater Management, consisting of team members from Grontmij (supported by a Chinese MSc participant) from the Dutch side, in collaboration with the Jiangsu Provincial EPB (Environmental Protection Bureau) and Zheijang Monitoring Station from the Chinese side (as allocated by SEPA).

In the next chapter, the Terms of Reference (ToR) for the Jiangsu Provincial EPB and Zheijang Monitoring Station are described. This chapter gives a general overview of the overall Engineering Study objectives and activities.

1.2 Problem description

Organic substances and nutrients from untreated domestic and industrial wastewater discharges contribute to the pollution of Lake Taihu. Current pollution control efforts, i.e. wastewater treatment plants, are extensive but hampered by economical, technical and institutional constraints.

1.3 Objectives

The overall objective of the Engineering Study is to recommend and prioritise engineering projects regarding wastewater treatment to assist local governments in decision making. The following sub-objectives can be distinguished:

1. to identify the sources, amount and characteristics of domestic and industrial wastewater;
2. to evaluate the performance of the wastewater treatment measures after the implementation of phases 1 and 2 of the Ninth 5-year and Year 2010 Taihu Catchment Pollution Control and Prevention Plans;
3. to propose feasible wastewater treatment methods suitable for the specified sources;
4. to recommend priority projects for wastewater treatment to reduce the wastewater pollution of Lake Taihu.

The outcome of the engineering study will provide an overview of the total pollution load from domestic and industrial wastewater to Lake Taihu and the achievable pollution load reduction resulting from wastewater treatment measures.

1.4 Project activities

Referring to the project objectives, the following project phases and activities can be distinguished:

Phase	Activities
1. project planning	1. plan of approach for the engineering study
2. data collection: existing situation and pollution load	2. sources, amount and characteristics of domestic and industrial wastewater 3. institutional, regulatory and financial framework 4. performance of the existing wastewater treatment measures 5. total current pollution load
3. study: proposed treatment technologies and achievable pollution load reduction	6. advanced N and P removal methods 7. feasible treatment technologies for specified wastewater sources 8. pollution load after implementation of wastewater treatment measures
4. recommendation: priority cleaning-up projects	9. recommendation for approximately three priority projects
5. reporting	10. final report

1.5 Time period

The period of the Engineering Study is from 1-9-00 till 30-11-01, and consists of the following 5 time periods:

- September '00 - December '00: project planning
- January '01 - April '01: data collection
- March '01 - August '01: study
- August '01 - September '01: recommendation
- September '01 - November '01: reporting

1.6 Scope

The scope of the study is limited to the domestic and industrial wastewater sources, and does not take into account diffuse sources such as from agricultural runoff. Note: in China, small sources of pollution, discharging less than 100 kg COD/d, are considered non-point sources. Focus is on the relevant sources, among others in terms of feasible pollution control efforts applicable for these sources. The study area is the Lake Taihu Basin catchment area.

2 ToR Chinese counterparts

2.1 Introduction

For their respective provinces, the Jiangsu Provincial EPB and Zheijang Monitoring Station will act as the counterpart organisation to Grontmij for the Engineering Study of the Masterplan Lake Tai project. These Terms of Reference describe the tasks and responsibilities of these two organisations for the Task Group Wastewater Management.

The contents of support activities from the counterpart organisations are described below. Reference is made to the project activity numbers listed in section 1.4. The following parts are distinguished:

- domestic and industrial wastewater
- institutional framework
- industrial wastewater treatment
- feasible treatment technologies
- priority projects

The counterpart organisations will also provide logistical and organisational support to the Grontmij project team for the Engineering Study.

2.2 Domestic and industrial wastewater

Determine the sources, amount and characteristics of domestic and industrial wastewater in the Lake Taihu Basin (activity 2)

Data collection:

- number of people/cities, water consumption/capita
- number and type of industry
- amount and characteristics of domestic wastewater (as much as possible specific for neighbourhoods)
- amount and characteristics of industrial wastewater (as much as possible specific for types of industry)
- map of project area: urban areas, industry areas and location of the major polluting enterprises, sewer lines, surface waters
- sanitation practices and collection systems (population served, night soil, sewerage)
- existing sewer system: where, type (separate or combined), year of construction, point of discharge
- method of discharge - pre-treatment (e.g., septic tanks, settling, infiltration)
- building codes, design, costs for pre-treatment (e.g., septic tanks)
- plus the prognosis for the development of the above data

Methodology:

- collection of existing data available at provincial and municipal agencies, including local construction bureau's and the Taihu Basin Water Resources and Protection Bureau
- data assembling, classification of sources
- English translation and reporting

Time input: approximately 4 man-months Jiangsu Provincial EPB and 4 man-months Zheijang Monitoring Station
Time period: January - March 2001

2.3 Institutional framework

Describe the institutional, regulatory and financial framework for wastewater treatment in Lake Taihu Basin (activity 3)

Data collection:
- regulatory framework (e.g., standards)
- institutional set-up: organisation responsible for design, construction and operation of sewer systems and treatment plants
- technical know-how and managerial capacity
- financial feasibility: costs for collection and treatment, investment budget, price of water; fees (water and/or discharge)
- scope for cleaner production (water saving and re-use in industry)

Methodology:
- description of already available information at national, provincial and local agencies, including the Taihu Basin Water Resources and Protection Bureau

Time input: approximately 2 man-months Jiangsu Provincial EPB and 2 man-months Zheijang Monitoring Station
Time period: April 2001

2.4 Industrial wastewater treatment

Evaluate the performance of the industrial wastewater treatment measures (part of activity 4).

Data collection:
- the number of industrial wastewater treatment plants in operation by the end of 2000 (location, system, design capacity and treatment performance, discharge quantities)

Methodology:
- collect data on industrial wastewater treatment plants from licenses and monitoring data and from local construction bureau's and the Taihu Basin Water Resources and Protection Bureau

Time input: approximately 1.5 man-months Jiangsu Provincial EPB and 1.5 man-months Zheijang Monitoring Station
Time period: January - March 2001

2.5 Feasible treatment technologies

Discuss feasible treatment technologies for specified wastewater sources (part of activity 7)

Discuss with Grontmij mission to China, in consultation with design bureau and construction department:
- the *relevant* wastewater sources
- criteria to assess the feasibility of wastewater treatment technologies with regard to the application in the Lake Taihu Basin (technical, institutional and financial feasibility criteria)

- feasible treatment technologies for relevant wastewater sources (including as well cleaner production options aimed at prevention of wastewater)

Time input: approximately 2 man-months Jiangsu Provincial EPB and 2 man-months Zheijang Monitoring Station
Time period: May 2001

2.6 Priority projects

Discuss recommendations for priority projects for wastewater treatment (part of activity 9)

Facilitate, in consultation with design bureau and construction department, an interactive workshop with Chinese representatives and the Grontmij project team on:

- proposed priority projects based on the study results

Time input: approximately 0.5 man-months Jiangsu Provincial EPB and 0.5 man-months Zheijang Monitoring Station
Time period: August 2001

2.7 Total time input

The total time input for the Engineering Study is approximately:

- 12 man-months Jiangsu Provincial EPB, and
- 12 man-months Zheijang Monitoring Station.

3 Practical Arrangements

3.1 Obligations and deliverables

Both counterpart organisations will provide logistical and organisational support to the Grontmij project team for the Engineering study, especially during the two Grontmij missions to Taihu (in June and September 2001).

Both counterpart organisations will regularly (every two weeks by e-mail) inform Grontmij on the progress and outcome of the activities described above in the ToR.

Concerning the first 3 project activities, the following deliverables will be submitted to Grontmij (in English language reports):

- 28 February: draft report on the sources, amount and characteristics of domestic and industrial wastewater
- 15 March 2001: final report on the performance of the industrial waste-water treatment measures
- 31 March 2001: final report on the sources, amount and characteristics of domestic and industrial wastewater
- 30 April 2001: final report on the institutional, regulatory and financial framework for wastewater treatment

The mentioned dates assume a starting date early 2001, subject to the project inception report approval by SEPA.

3.2 Grontmij project team

Project manager for the Masterplan Lake Tai project is Mr Enrico Moens of Grontmij. Ms Wendy Tao of Grontmij-Shanghai will act as the project co-ordinator China.

The Grontmij project team for the Engineering study consists of:

- Mr Hillebrand Ehrenburg, task group leader Wastewater management
- Mr Jos Frijns, project administrator
- Mr Toine Schouten, technical adviser
- Mr Jianhua Zhang, MSc participant (Department of Water Resources of Jiangsu Province)

3.3 Communication

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The project number for reference is: 1346901/43

Terms of Reference

Renmin University of China

Socio-economic and Institutional Study (1346901/40.4)

Masterplan Lake Tai project,

Task Group Socio-economic and Institutional Aspects

Grontmij Group
Houten, 21 August 2001

Contents

1 Introduction

1.1 Socio-economic and Institutional Study

The Masterplan Lake Tai project is based on an integrated approach for sustainable lake management. It is a collaboration between Grontmij Consulting Engineers (The Netherlands) and SEPA (State Environmental Protection Administration, China). The project basically includes two parts: the short-term Cleaning-up Programme (Phase 1) and the long-term Master Plan Study (Phase 2). In both studies, socio-economic and institutional aspects play a role.

The socio-economic and institutional analyses in this project will be carried out by the Task Group Socio-economic and Institutional Aspects, consisting of team members from Grontmij and IHE-Delft on the Dutch side, in collaboration with Renmin University of China on the Chinese side. Two separate, but inter-related sets of activities can be distinguished: those focussing on socio-economic data and analysis, and those focussing on institutional aspects.

In the next chapter, the Terms of Reference (ToR) for Renmin University are described. This chapter gives a general overview of the overall Socio-economic and institutional study objectives and activities.

1.2 Problem description

The present water quality situation of Lake Tai is the result of socio-economic activities in the area. On the other hand, all technical measures to be taken to improve the water quality of Lake Tai have socio-economic implications. Taking these activities and implications into account is therefore an important part of the Masterplan study.
Water quality improvement measures are to be carried out by institutions active in the water management of Lake Tai, and they will be inflicted on the users of the Lake. It is therefore necessary to find out whether the current institutional framework can cope with the effective implementation, and enforcement of such measures, and will be able to monitor their effects.

1.3 Objectives

The overall objective of the Socio-economic and Institutional Study is to provide information and analysis regarding significant socio-economic and institutional implications of actions proposed in the Masterplan. The following sub-objectives can be distinguished:

Socio-economic study:

- to provide relevant socio-economic data and analysis for other Task Groups, to enable these groups to make more balanced decisions on recommending alternative measures to improve the water quality of Lake Tai;
- to investigate important socio-economic aspects of the Masterplan Study in general regarding policy and implementation.

Institutional study:

- to provide relevant institutional data for other Task Groups;
- to provide relevant information on international practices of water management, in particular those related to the change-over from a state-planned to a more market-oriented economic system;
- to provide recommendations for short-term measures to alleviate current problems in the water management structure and practices of Lake Tai.

1.4 Activities Socio-economic part

Referring to the project objectives, the following four project phases can be distinguished:

Phase	Outcome
1. Project planning	1. plan of approach for the socio-economic study
2. data collection	2. compilation of existing statistical material
3. socio-economic research	3. clarification of links between standard statistical information and environmental indicators
	4. supportive research for Task Groups
	5. additional research, on a needs basis
4. reporting	6. final report

1.5 Activities Institutional part

In this section an overview will be given of what the institutional aspects for the Masterplan study consist of. First of all the desired deliverables will be presented, which form the basis for the proposed approach. This approach is divided into four phases, each consisting of a number of activities.

During the technical meeting in November 2000, and the follow-up in Beijing, the principal and the consultant reached agreement over the desired deliverables for the institutional part of the study. These are:

- A description of the institutional frameworks of China, the Netherlands and perhaps one or more other (European) countries: comparison and explanation of the differences.
- Information on the possible changes in the administrative water management structure of China because of a transition from planned to market-oriented management system: strengths and weaknesses of different systems.
- Options for short-term solving of current problems in the water management structure of Lake Tai.

Referring to the project deliverables, five phases can be identified.

Phase	Outcome
1. project planning	1. plan of approach for the institutional study
2. data collection	2. data collection
	3. description of general water management structure in China
	4. additional data collection
3. international practices and long-term development	5. description of international water management frameworks and ideas for long-term development of Chinese water management system
4. analysis of water management of Lake Tai	6. local data collection
	7. identifying key organisations
	8. workshop on water management issues
	9. additional research
5. reporting	10. final report

Phases 1, 3 and 5 will primarily be carried out by the Dutch team. Phase 2 will mainly be done by Renmin University, while both sides will work on Phase 4 jointly.

1.6 Time period

The period of the Socio-economic and Institutional Study is from September 1st 2000 till September 1st 2002, and consists of the following periods:

Socio-economic part:

- Phase I: September - December 2000
- Phase II: January - March 2001
- Phase III: May 2001 - June 2002
- Phase IV: June - September 2002

Institutional part

- Phase I: September - December 2000
- Phase II: January - September 2001
- Phase III: May 2001 - August 2001
- Phase IV: January 2001 - June 2002
- Phase V: July - September 2002

1.7 Scope

To define the scope of the Task Group's activities accurately, some assumptions have been made:

- The (national) Chinese legal and administrative framework (i.e. the different laws and organisations present) will be regarded as constant entities for the short term. Changes in these can occur on the longer term, as a result of changes taking place independent of the project. For the short-term analysis of the institutional framework in the Taihu area these are not taken into account.
- The main unit of analysis will be the separate organisations involved. Especially on regional and local level individual departments in organisations will not be considered, as this will make the analysis too complex for the given timeframe.

1.8 Expected outcome

The socio-economic study will result in:

- knowledge of relevant socio-economic impacts of the different measures proposed in the Masterplan;
- Detailed knowledge of desired socio-economic aspects (yet to be defined).

The institutional study will result in:

- An overview of water management practices in several countries;
- Ideas for the long-term transition from a planned towards a market oriented water management organisation in China;
- Recommendations for solving possible short-term problems in the management of Lake Tai.

2 ToR Chinese counterpart

2.1 Introduction

Renmin University of China will act as the counterpart organisation to Grontmij for the Socio-economic and instiututional aspects of the Master-plan Lake Tai project. These Terms of Reference describe the tasks and responsibilities of this organisation for the Task Group Socio-economic and Insitutional Aspects.

The contents of support activities from the counterpart organisation are described below. Reference is made to the project activity numbers listed in section 1.4 and 1.5. The following parts are distinguished:

- Socio-economic study:
  - compilation of existing statistical material
  - clarification of links between standard statistical information and environmental indicators
  - supportive research for Task Groups
  - additional research
- Institutional study:
  - data collection and description of general water management structure
  - analysis of water management system of Lake Tai (local data collection, identifying key organisations, workshop)

2.2 Socio-economic Study

Below, the activities for Renmin University on the socio-economic field are presented. This is based on the overview presented in Section 1.4.

2.2.1 Compilation of existing statistical material (activity 2)

Data collection:

- Collection of statistical materials on Taihu Basin regarding population characteristics, land use and main economic activities by sector in the recent period, at levels of dis-aggregation and in spatial format as to be compatible with area-based pollution loads in the region (on city, town and rural district basis).
- Population growth trends and projections for geographic localities. If there is great uncertainty about migrations trends, to be expected in a highly dynamic region, both high and low range indications should be known.
- Large-scale industrial pollution: These industries are the chemical sector, the metallurgical industry, the building materials industry and the light industry (e.g. paper mills). Polluting plant sites should be linked to economic units, for instance in multi-plant economic enterprises, and their sector classification should be identified consistent with the standard Industrial Classification in current use in China to compile industrial censuses, surveys and/or Input-Output tables.
- Non-point sources may include large numbers of relatively small industrial polluters. This may require a special sample study to be undertaken, in a manner consistent with the sector classification emerging from the inventory of large polluters.

- Agriculture: pollution loads per hectare for major agricultural crops. A sub-division may be needed for farmers using different technologies and high external input levels, and those using low external input levels.
- Household sector: Household level pollution levels for different rural and urban localities. The latter differentiated by income classes.

Methodology:
- Review of statistical yearbooks at national, regional and local level
- Methodological problems encountered should be discussed during the intended visit of Chinese team members to the Netherlands foreseen for May 2001.

Time input: 4 man-months
Time period: January 2001 - March 2001

2.2.2 Linking statistical and environmental indicators (activity 3)

Data collection:
- To establish the relation between socio-economic and environmental indicators for specific areas of the sample survey study, e.g. pollution loads for different land uses, urban-rural (and income class) differences in environmental behaviour of households
- To integrate the results of the special sample survey for non-point polluters with the broader data availability in the initial data inventory, as discussed above.

Methodology:
- Co-operation in research activities on non-point sources between NIES and Renmin University
- Additional sampling for specific unresolved areas (e.g. population/company samples).

Time input: 4 man-months
Time period: May 2001 - May 2002

2.2.3 Supportive research for Task Groups (activity 4)

Research among others:
- cost-effectiveness analyses of proposed measures;
- options for cost-recovery of proposed measures;
- valuation of proposed measures on socio-economic indicators (e.g. influence on public health, employment rates, economic implications for companies)

Methodology:
- dependant on type or research, always in co-operation with relevant Task Groups

Time input: 6 man-months
Time period: June 2001 - June 2002

2.2.4 Additional research (activity 5)

Depending on the need, additional socio-economic research may be desirable. Possible topics include a more detailed study on financing of pollution abatement measures or implications of pollution on public health.

Time input: 2 man-months
Time period: September 2001 - June 2002

2.3 Institutional Study

Below, the activities for Renmin University on the institutional field are presented. This is based on the overview presented in Section 1.5.

2.3.1 Data collection (activities 2 and 3)

- Planning function:
  - Relevant policies on environmental protection in general and water management in particular (plans like the Taihu Basin Water Resources Protection Plan, The Ninth Five-Year Plan, the Three rivers, three lakes policy, etc); Summary and translation
  - Relevant national laws and decrees; Summary and translation
  - Relevant regional and local legislature, plans, procedures: Summary (and translation where necessary)
  - Overview of national, regional and local decision makers; description of tasks and responsibilities
- Operational Management function:
  - Overview of national, regional and local organisations with managing tasks and competencies; description of tasks and responsibilities; description of relations with other organisations;
  - Overview of budget flows to and from these organisations, and the budget allocation criteria concerning these organisations;
  - Overview of available instruments to influence lake and users (including data on results and effectiveness or instruments if available)
  - Overview of relevant users and other stakeholders
- Analytical Support function:
  - Overview of research institutes and other information service providers
  - Overview of instruments used to provide information services (e.g. monitoring systems, land registry systems)

Methodology:

- review of relevant literature, policy documents and legislature

The management framework should consist of all organisations on national, regional and local level which have something to do with water management. An initial survey made clear that on national level the decision-making organisations directly involved are SEPA, the Ministries of Water Resources, Construction, Agriculture and Transport, and the State Forest Administration. More general ministries like the Ministry of Finance may also have some competencies in this field. The formal tasks and competencies that these and underlying organisations have should be clear in order to understand the system.

The outcomes of this phase are a report consisting of a schematic of the Chinese water management system, a description (including tasks, responsibilities and main instruments) of the organisations in this management system, and a summary / translation of the relevant policy documents and laws. Depending on the needs, to be determined during the visit to the Netherlands in May 2001, additional data collection may be required.

Time input: 3 man-months
Time period: January 2001 - September 2001

2.3.2 Local data collection (activity 5)

Local data collection will comprise of identifying all institutions in the Lake Tai Basin which have a relation with the water management of the lake.
Data collection:

- for each organisation among others:
  - tasks and responsibilities
  - place in hierarchy
  - budget sources
  - relations with other organisations
  - instruments at disposal
  - specific interests

Methodology:

- based on a standard data sheet, to be developed by the Task Group

Time input: 4 man-months
Time period: May 2001 - December 2001

2.3.3 Identifying key organisations (activity 6)

After the data collection, key organisations will be identified, for which additional data collection in the form of interviews may be needed.

Time input: 1 man-month
Time period: December 2001 - February 2002

2.4 Total time input

The total time input for Renmin University is:

- 16 man-months for the Socio-economic Study;
- 8 man-months for the Institutional Study.

3 Practical Arrangements

3.1 Obligations and deliverables

Renmin University will regularly (every month by e-mail) inform Grontmij on the progress and outcome of the activities described above in the ToR.

Concerning the project activities, the following deliverables will be submitted to Grontmij (in English language reports):

- 28 February 2001: Data Collection Report on socio-economic and institutional aspects: preliminary overview of available statistical and institutional data;
- 1 April 2001: Socio-economic information report (results of Activity 2 of Socio-economic study);
- 15 April 2001: Report on Chinese Water Management Framework (results of Activity 2 of Institutional study);
- 1 May 2002: Report on links between standard statistical information and environmental indicators (especially non-point pollution);

The mentioned dates assume a starting date early 2001, subject to the project inception report approval by SEPA.

3.2 Grontmij project team

Project manager for the Masterplan Lake Tai project is Mr Enrico Moens of Grontmij. Ms Wendy Tao of Grontmij-Shanghai will act as the project co-ordinator China.

The Task Group Socio-economic and Institutional Aspects consists of:

- Mr Aart van de Laar, Task Group leader
- Mr Paul van Hofwegen, institutional expert
- Mr Erwin de Bruin, administrator

3.3 Communication

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The project number for reference is: 1346901/40.4

Terms of Reference

State Environmental Protection Administration

Training Aspects

Masterplan Lake Tai Project, Task Group Training & Transfer of Knowledge

Grontmij Group / IHE-Delft
Houten, 21 augustus 2001

Contents

1 Introduction

1.1 Training Aspect

The Masterplan Lake Tai project is based on an integrated approach for sustainable lake management. It is a collaboration between Grontmij Consulting Engineers (The Netherlands) and SEPA (State Environmental Protection Administration, China). The project basically includes two parts: the short-term Cleaning-up Programme (Phase 1) and the long-term Masterplan Study (Phase 2). In this Masterplan study many people from the various partners are involved. Since they come from different disciplines and have different educational backgrounds, a tailormade course for the Chinese partners in the master plan study will be designed and executed. As a matter of fact two courses will be given: one course for Chinese professionals and one course for Chinese officials. The two courses will however have common elements.

This training will be carried out by the Task Group Training & Transfer of Knowledge, lead by IHE-Delft and supported by Grontmij. The Chinese counterpart for the training organisation is the State Environmental Protection Administration (SEPA).

In the next chapter, the Terms of Reference are given for SEPA concerning the training aspects of the Masterplan project. In this chapter an introduction will be given of the training objectives and activities.

1.2 Problem description

The professionals participating in the Masterplan Lake Tai project originate from many different Chinese organisations and they have various backgrounds. Although many of them have a good knowledge about lake ecosystems and about Taihu in particular, not everybody has knowledge about all aspects. Therefore a short course on lake ecosystems and lake management for the professionals participating in the project is proposed.

The Government officials participating in this project do not always have full knowledge about lake ecosystems and the management of lakes. A study tour to the Netherlands, where relevant Dutch organisations can be visited and ideas can be exchanged about different methods of lake management is therefore also proposed.

1.3 Objectives

The overall objective of the Training is to increase the knowledge of the participants in the field of lake ecosystems and lake management.

1.4 Project Activities

IHE-Delft, in co-operation with Grontmij, will organise a training and a study tour in May 2001. Two parts can be distinguished:

- A four-week training for Chinese professionals, concentrating on technical aspects of lake management. This training will consist of lectures, a role-play and various field visits and excursions.
- A two week study tour and training for Chinese officials, consisting of visits to Dutch Government institutes and other organisations, field visists and attendance of the presentations of the role-play (part of the professional training).

1.4.1 Activity 1: Training for Chinese professionals

The course will consist of lectures, a role-play and field visits/excursions. In co-operation with SEPA and based on the background of the course participants, lectures to be given will be selected. Reference is made to the information material (IHE-Delft brochures) which were handed over during the Technical Meeting, and contain a good overview of lecture possibilities.

It should be noted that the participants of the training should have a good working knowledge of the English language. For the training organisers, it is important to obtain a list of proposed participants, including their affiliation, position, and (very important) their educational background.

1.4.2 Activity 2: Study tour and Training for Chinese officials

The study tour and training will consist of visits to various institutions, field excursions and attendance of the role-play.

Organisations to be visited and field trips will be selected in co-operation with SEPA, and may include:

Organisations
- Netherlands Ministry of Transport, Public Works and Water Management
- Netherlands Ministry of Housing, Land-use planning and the Environment
- Institute for Inland Water Management and Waste Water Treatment RIZA
- National Institute of Public Health and the Environment
- Water Board
- Provincial and municipal authority
- Monitoring station and aquatic laboratory

Field trips
- Lake IJssel
- Easter Scheldt Flood Protection Works
- Millingerwaard (river project)
- Madurodam, tulip fields etc.

A list containing the participating officials, their affiliation and position should be received by the training organisers.

1.5 Time period

The period of the training is from May 1st 2001 until May 31st 2001, and consists of the following two time periods:
- May 1 - May 25 2001: Training for the professionals
- May 21 - May 31: Study tour and training for the officials

2 ToR Chinese counterpart

2.1 Introduction

For the training aspect, the State Environmental Protection Administration (SEPA) will act as counterpart organisation. These Terms of Reference will describe the tasks and responsibilities of SEPA for the Task Group Training & Transfer of Knowledge.

2.2 Participant list

SEPA will provide IHE with a list of the participants for the visit to The Netherlands. This list will be separated in a list with names of officials and a list with names of professionals. The list of officials will include their affiliation and position. The list of professionals will include their affiliation, position and, very important, their educational background. The above information is needed before February 15 2001.

2.3 Training needs

SEPA can indicate to IHE-Delft specific training needs for the professionals and can provide ideas for the study tour. Reference is made to the IHE brochure supplied earlier, the following lecture possibilities are examples:

- Aquatic ecology
- Environmental quality
- Wetland values
- Ecosystems
- Biodiversity
- Lake management

2.4 Travel and accomodation

SEPA is responsible for the international travel arrangements and international travel costs of the participants, as well as for the costs of meals and accomodation in the Netherlands. If requested, IHE-Delft can assist in finding suitable accomodation.

2.5 Visa

The participants are responsible for obtaining the necessary passport and visa, IHE-Delft will assist as much as possible. It should be noted that visa procedures for the Netherlands take a considerable amount of time. It is recommended that SEPA co-ordinates the visa application procedure.

3 Practical arrangements

3.1 Obligations and deliverables

Concerning the Training aspect, one deliverable can be distinguished: the list of training participants (including further info as specified in the ToR) should be sent to IHE-Delft by SEPA on **February 15, 2001**.

3.2 Grontmij Project Team

Project manager for the Masterplan Lake Tai project is Mr Enrico Moens of Grontmij. Ms Wendy Tao of Grontmij-Shanghai will act as the project co-ordinator China.

The IHE project team for the Training Aspects consists of:

- Mr Hans van Bruggen, course leader
- Ms. Annemieke van Zuylen, IHE Student Affairs Department
- Depending on the study needs, several teachers from IHE-Delft, Grontmij and other organisations.

3.3 Communication

All communication can be directed to hvb@ihe.nl or

Hans van Bruggen
IHE Delft
P.O. Box 3015
2601 DA Delft
The Netherlands
tel: +31-15-2151778
fax: +31-15-2122921

Annex 4

Time schedule

Time schedule "Masterplan Lake Tai"

Annex 5

Chinese partner organisations

Annex 5 Presentation of Chinese partner organisations

Below, the Chinese organisations which are involved in the Masterplan study are described into more detail.

State Environmental Protection Administration

The State Environmental Protection Administration of China is a ministerial-level authority directly under the State Council in charge of environmental protection in China. Its main responsibilities on water pollution control are as follows:

- To formulate the national environmental policy, laws administrative regulations, standards for environmental quality and for pollutants emission;
- to conduct environmental impact assessment of major economic and technical policies, development planning and key economic development plans; to formulate and monitor the implementation of the national plan for pollution control and ecological conservation in key regions and river basins;
- to organize, guide and coordinate the efforts in dealing with major environmental problems involving different departments, localities, river basins and regions;
- to supervise the urban and rural ecological conservation and the construction of national ecological demonstration areas and the eco-agriculture;
- to be responsible for environmental monitoring, statistics and information collection; to organize the construction and management of the national network of environmental monitoring and of environmental information;

Pollution Control Department

Main responsibilities on water pollution control of Pollution Control Department are:

- to formulate and supervise the implementation of the pollution prevention and control plan of key river basin and regions;
- to organize the zoning of environmental functions of different water regions such as industry, agriculture, living and so on, and to supervise environmental protection of different water regions;
- to organize the implementation of pollution emission licensing;
- to organize and implement the monitoring and information publication of river basin;
- to guide and coordinate different local government formulate environmental policy and regulations for river basins;
- to organize and coordinate environmental protection and ecological conservation involving different river basins and regions.

Foreign Economic Cooperation Center

FECO is taking charge of foreign economic cooperation in the field of environment. It is responsible for managing the implementation of the projects funded by international organizations such as the World Bank, ADB, GEF, and bilateral of regional funding agencies and other sources. It also undertakes routine work for implementing some international environmental agreements in China. The center acts as secrtariat for China Council for International Cooperation on Environment and Development, provides service for international cooperation activities. The office of Leading Group of Foreign Economic Cooperation of SEPA is also established in this center.

Nanjing Institute for Environmental Sciences

NIES undertakes the research on rural ecology, nature conservation, prevention and control of the pollution from township and village industrial enterprises and agricultural chemicals, undertakes national key research programs on the rural environment, nature and ecological conservation, provides a scientific basis and technical support for the management of rural environment and nature and ecology conservation.

Renmin University, Institute of Environmental Economy

The Institute of Environmental Economics (IEE), Renmin University of China was founded in 1988. Establishment of IEE obtained support of China State Education Commission (SEC) and China National Environmental Protection Agency (NEPA). Based on the over ten year's hard efforts of its staffs, it has now become an institution for education and research with important impact in the fields of environmental and natural resources economics and policy analysis in the world and in the country. It also is the only education unit of environmental economics who simultaneously has three academic degrees in Ph.D., Master and Bachelor.

IEE has three main duties:

- Foster the excellent talents with high qualitative education needed by abroad and domestic academia, government apparatus and enterprises.
- Provide all levels of government, enterprises, the public and the international communities with theory apocalypses, analysis tools and policy recommendations that will promote the sustainable development in the fields of environmental economics and management.
- Promote to share the information and knowledge about sustainable development among the abroad and domestic.

IEE currently has 10 teachers on service, including 4 professors, 3 associate professors, 2 senior researchers, 4 lecturers, one engineer, and 5 visiting professors. And it has 113 students including 20 PhDs, 14 masters, 40 undergraduates owned two degrees (fostered together with Tsinghua University) and 39 undergraduates.

IEE consists of three research divisions. They are Environmental Planning Division, Natural Conservation Division, and Public Policies for Environmental Protection Division. The main research fields include:

- Research the basic theories of environmental and natural resources economics
- Environmental policies study
- Environmental planning research
- Evaluation the environmental and natural resources economy
- The economics analysis of development projects
- Exercise the econometrics approach to analyze the quantitive relationship between atmosphere pollution, energy consummation and economy development
- Integrated research of wetland and economy development
- Research of the designation and enforcement of CDM
- Economics analysis of environmental policies (mainly focused on the fields of environmental tax, pollution charge, emission trade and economics analysis of environmental regulation)
- Ecosystem analysis
- Eco-agriculture research
- IEE developed the comprehensive partnership in the world and the country in the course of education and research. It have undertaken many projects since its establishing, including on-going research projects. The projects comes from SEPA, Finance Ministry□State Education Ministry, Agriculture Ministry and Beijing city government, as well as World Band, Asia Development Bank, EU, WWF, UNDP, etc. The partners include Economics Institute of London, Stanford University, Carnegie-Mellon University, Kyoto University, Environmental Defense Fund, RFF, WRI, etc.

Taihu Basin Water Resources Protection Bureau

Located at 388 Yixian Road, Shanghai, Taihu Lake Basin Authority of Ministry of water Resources(TBA) is an agency under the command of the Ministry of Water Resources, which is responsible for the total control of the water affairs of the Taihu Lake Basin. Under TBA there are departments of planning, water reservoir, water affairs, water control, water resource protection. At present TBA is working in cooperation with the department in charge of water affairs of Jiangsu province, Zhejiang province and Shanghai.

Jiangsu Environmental Protection Bureau

Jiangsu International Environmental Development Center JIEDC was established in 1993. There is 15 staff at present, including 3 senior engineers and 8 engineers.
Scope of activities:

- Environmental projects implementation financed by international financial organizations and foreign government loans.
- Foreign government financed technical aid projects in environmental protection area.
- Consulting in planning, feasibility study and environmental assessment etc.
- Consulting in ISO1400.

Jiangsu Provincial Environmental Monitoring Center is a public institution of social benefit based on the technical supervision and administration. It is under the direct leadership of Jiangsu Provincial Environmental Protection Department. It is also providing the operational and technical instruction to the environmental monitoring stations at different levels in Jiangsu Province. There is a professional monitoring team of experience and expertise. Its responsibilities are hereby given out as follows:

- Involvement in the environmental policy, regulation and technical regulation of environmental monitoring in Jiangsu Province
- Organizing the constitution of environmental monitoring planning and annual framework in Jiangsu Province and supervising the implementation
- Provincial environmental monitoring data collection and reporting to SEPA, analyses of the provincial environmental status and pollution discharge, composing the environmental quality bulletin and providing the various monitoring data for the governmental environmental status bulletin
- Organizing and participating in the survey of fateful pollution accidents and arbitrational monitoring for the pollution disputes in this province
- Technical and operational instruction, monitoring quality control and staff education for the environmental monitoring system in this province
- Research on the environmental monitoring science and technology

Zhejiang Environmental Monitoring Centre

Founded in 1980, Zhejiang Provincial Environment Monitoring Center boasts fifty-six staff members, among whom forty-seven are college or bachelor degree holders and five master degree holders. 69.1% of its staff members are professionals who have got their semi-senior professional titles. The center has been equipped with various large-sized analytical instruments, for example, color quality on-line, gas chromatograph, liquid chromatograph, ion chromatograph, atomic absorption spectrophotometer and a lot of normal monitors. As the provincial center of technology, information, network and training within its field the center has conducted 161 programs, including monitoring water (atmospheric precipitation) and waste water, environments atmosphere and waste water, soil, substrate, solid waster, biology (plant), natural of coal, motor pollution, noise and vibration. Up to now the center has finished almost one hundred scientific programs, among which thirty programs have won awards both at national and provincial levels.